The IASI/AIRS Radiances/Retrieval Data Sets Plans for CrIS/ATMS Proxy Radiance/ Retrievals and Evaluation

By

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Acknowledgements: Tony Reale, Frank Tilley, Kevin Garrett, NOAA/NESDIS/OSDPD

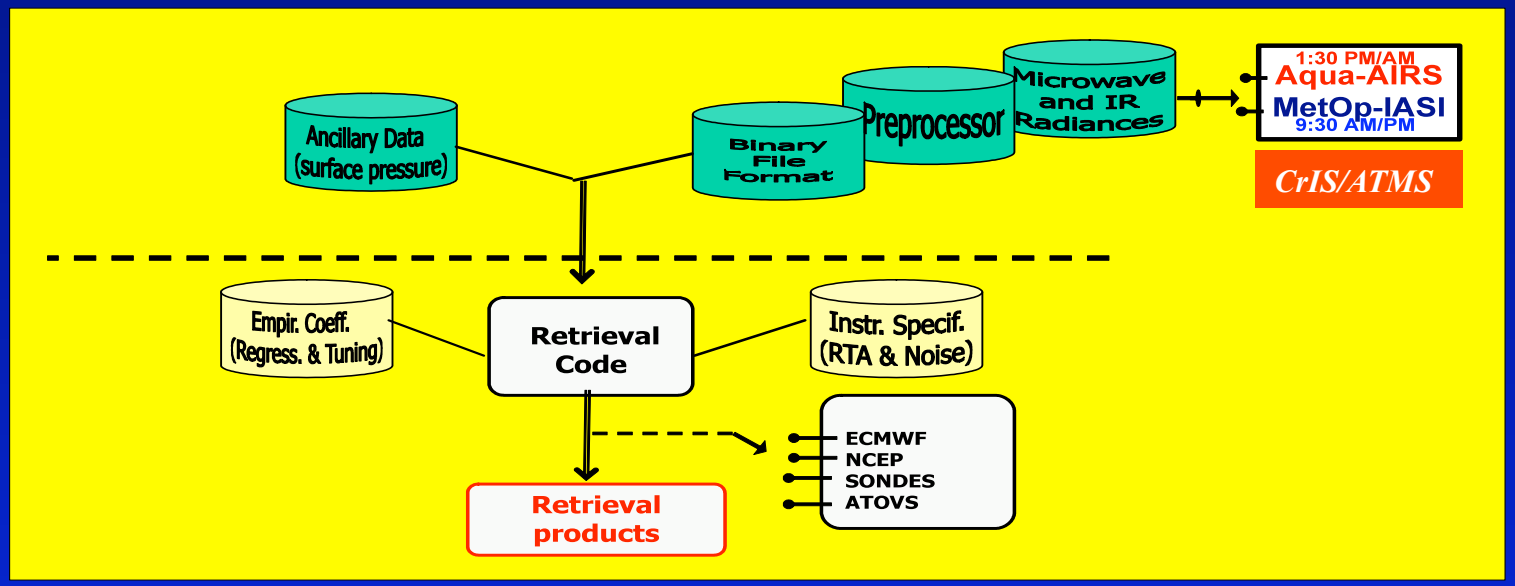
Overview

- Resources in place at NOAA/STAR to expedite NPP CrIS/ATMS EDR product evaluation
- On-going efforts and implementation plans toward:
  - » CrIS/ATMS (CrIMSS) proxy data generation using IASI/AMSU-A/MHS and (AIRS/AMSU-A) data sets
    - – Three data sets being used for CrIMSS proxy radiance generation and evaluation are described.
    - – Preliminary results on the generation of CrIS/ATMS proxy radiance data sets.
  - » Evaluation of Northrop Grumman Aerospace Systems (NGAS) CrIMSS Proxy Retrievals (EDRs) With:
    - – IASI/AIRS retrievals and Matched in-situ data sets.
      - A brief summary on the evaluation of NOAA-NUCAPS AIRS/IASI retrievals is included
    - – CrIMSS EDR products from NOAA Unique CrIS/ATMS Product System (NUCAPS)

Resources and Plans at NOAA
(To Evaluate CrIS/ATMS NGAS EDR Products)

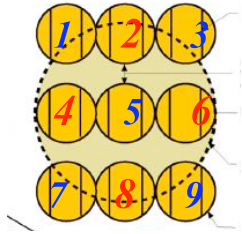
1. **Product Retrieval Algorithm(s)/Retrieval Products**
   - » NOAA Unique CrIS/ATMS Products (NUCAPS)
     - – AIRS V5 Retrievals; IASI Retrievals (and future CrIMSS Retrievals)
   - » NGAS Operational Algorithm – Science Code Interface
2. **Validation Data Sets (Three Different Data Sets)**
   - » **IASI/AIRS Radiances, Retrievals with Matched Global RAOBs, ECMWF, GFS**
   - » **Focus Day Data Sets of AIRS/IASI, ECMWF etc.**
   - » **AEROSE (Nick Nalli's talk)**
3. **Diagnostic Analysis and Monitoring tools**
   - » For Satellite Radiances
   - » Retrievals
4. **Ongoing Efforts/Plans for NPP- C1 & C3 CrIS/ATMS**
   - » **Implementation of NGAS Algorithm at NOAA/STAR**
   - » **Proxy Radiances (CrIS/ATMS) for the Focus Day 10/19/2007**
   - » **Implications of Using CrIS/ATMS Proxy Radiances from IASI/AMSU-A/MHS; AIRS/AMSU-A**

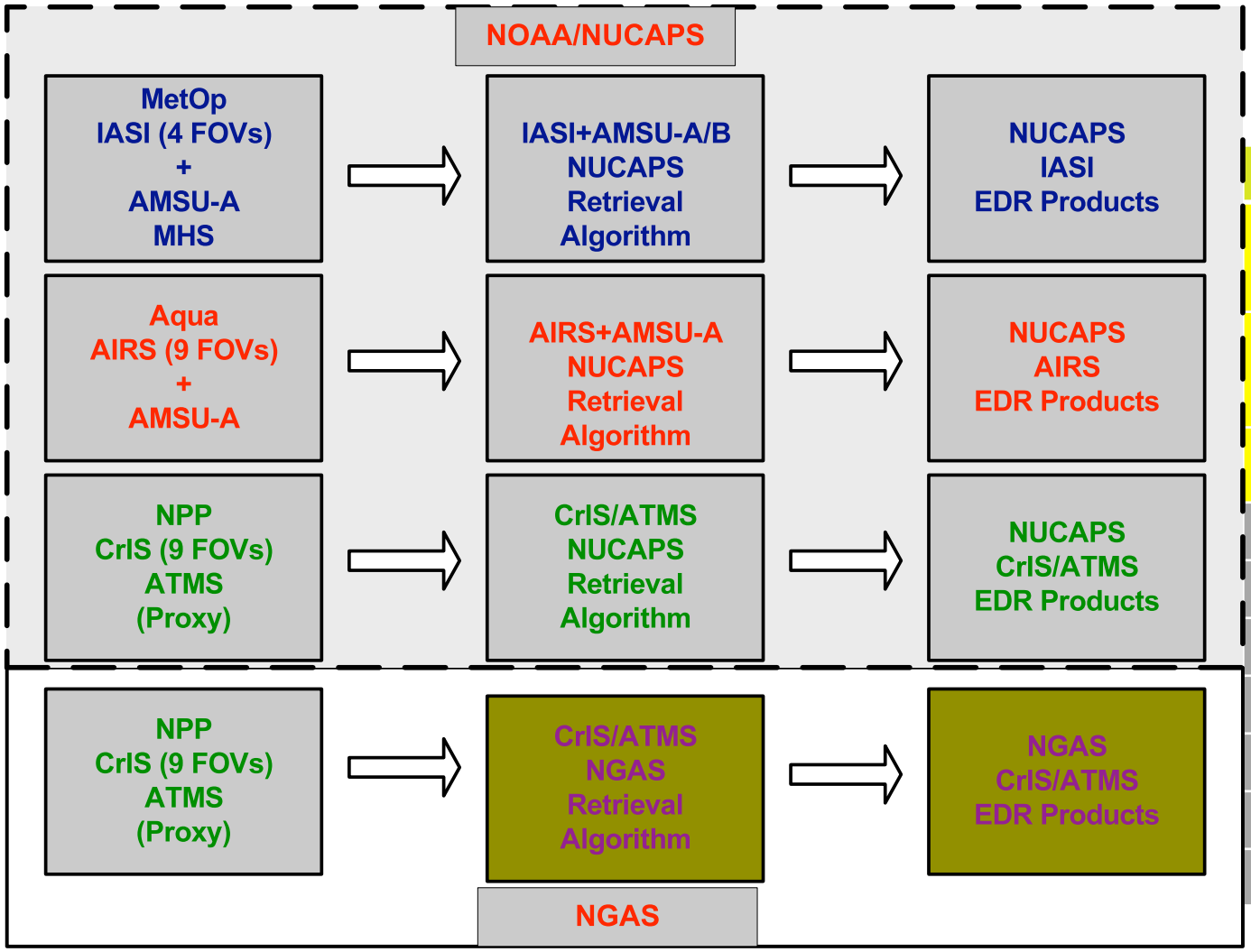
1. Product Retrieval Algorithms /Retrieval Products
NOAA Retrievals of Core Products and Trace Gas Products



- The NOAA level 2 retrieval processing system was developed during the Aqua mission (AIRS/AMSU)
- Expanded to retrieve MetOp (IASI/AMUS-A/MHS) T(p), q(p), O3(p) core products, and trace gas products (CH_4, CO, CO_2etc.)
- Emerging as NOAA-Unique CrIS/ATMS Product System (NUCAPS)
- Identical systems one for research and the other for operations for the IASI
  - » Research Version –
    - – Reprocessing Options with Algorithm Upgrades, New Data
    - – Emulate Various IASI/ AIRS Retrieval Algorithms
    - – Testing New Ideas in Retrieval Algorithm

Product Retrieval Algorithms /Retrieval Products
AIRS (V5) and IASI Retrievals
NGAS/NUCAPS CrIS/ATMS Products





Channels Used in The AIRS/IASI Physical Retrieval

	AIRS	IASI
CC	58 LW 15um	69 LW +SW
T	91 SW + LW	137 LW +SW
Q	41	79
O3	41	53
CO	36	33
CH4	59	59
CO2	70	79
HNO3	14	14
N2O	58	58
SO2	60	60

Validation Data Sets

Data Set 1: Collocated AIRS/IASI, In-Situ/Forecast data

About 60,000 Matches for IASI (2008-Current)

More than 150,000 Matches for Aqua AIRS (2002-Current)

MetOp-IASI/Aqua-AIRS
Match-up Database

Aqua-AIRS: (2002- Current)
MetOp-IASI: January 2008 - Current)

- RAOB Measurements Matched to Aqua (1:30 AM/PM) and MetOp(9:30 AM/PM) Satellite Observations
- MetOp-IASI/AMSU-A/AMSU-B Level1B Radiances
- IASI Level-2 Retrievals
- Aqua-AIRS/AMSU-A Level1B Radiances
- AIRS Level-2 Retrievals
- NCEP-GFS (AVN) Level2-Forecast/Analysis
- ECMWF Level-2 Forecast/Analysis
- NOAA-18 ATOVS/M2-ATOVS Level-2 Retrievals

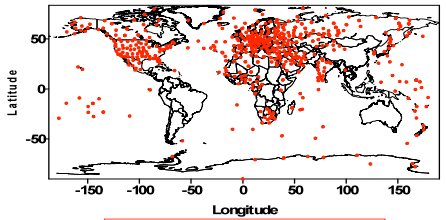
Collocated Within ±3 Hrs. & 100 Km Radius
Data Used : January 2008 - February 2009

Source of RAOB Data : OSDPD MDB

IASI and AIRS Global RAOB Matches (2008-2009) for Proxy Data Generation with both IASI/AIRS

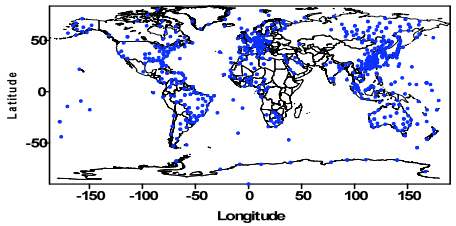
AIRS- Accepted Matches (After RAOB Selection):7897
(NH:75%,SH:25%); (LAND:90%, Sea:10%); (Day:48% Night:52%)
Tropics:12%; Mid-Lat:68% Polar:20%

IASI- Accepted Matches (After RAOB Selection):21035
(NH:70%, SH:30%); (LAND:77%, Sea:23%); (Day:60%,Night:40%)
Tropics:30%; Mid-Lat:63% Polar:7%



AIRS 1:30 PM/AM

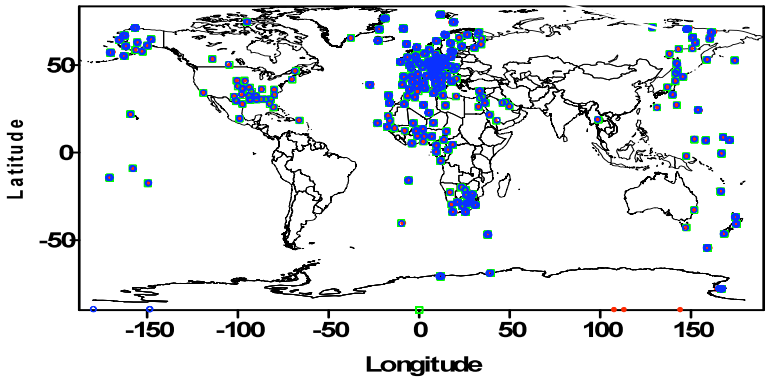
Space-Collocated Matches of AIRS/IASI with RAOBs



IASI 9:30 AM/PM

Matched Locations of MetOp-IASI, Aqua-AIRS with RAOBs

AIRS (1:30 AM/PM) RAOB IASI (9:30 AM/PM)



Common Data Set (N~1500)

IASI & AIRS
Radiances
Retrievals
RAOBs
+
Corresponding
ECMWF
AVN
ATOVS RET

This Data set can be used to generate CrIS/ATMS Proxy Radiances from both the IASI/AMSU-A/MHS and AIRS/AMSU-A to understand CrIS/ATMS retrievals and Cloud–Clearing Aspects.

What Has been Done at NOAA With These Data Sets

- **Multi-Satellite Instrument Retrieval Product Evaluation with RAOBs, O_3SNDs, ECMWF***
  - » Validity of the in-situ meas. (e.g. RAOBs) vis-à-vis ECMWF, GFS
  - » AIRS Retrievals *vs*. RAOBs, ECMWF; IASI Retrievals *vs*. RAOBs, ECMWF; AIRS *vs*. IASI; AIRS/IASI *vs*. ATOVS;
  - » Implications/Experiments from Version to Version
  - » Statistics (Global, NH, SH, Midlat etc.), Categories (Land, Sea, All)
- **Point-Measurements and Validations - As a Precursor to Interpret Global Grids/Annual Cycles derived from the Retrievals***
- **Differences and Impacts of 9FOV (AIRS) *vs.* 4 FOV (IASI) Cloud Clearing***

The Intent here is : ***Whatever is done with IASI/AIRS radiances/retrievals could be performed with CrIS/ATMS through Proxy radiances/retrievals.***

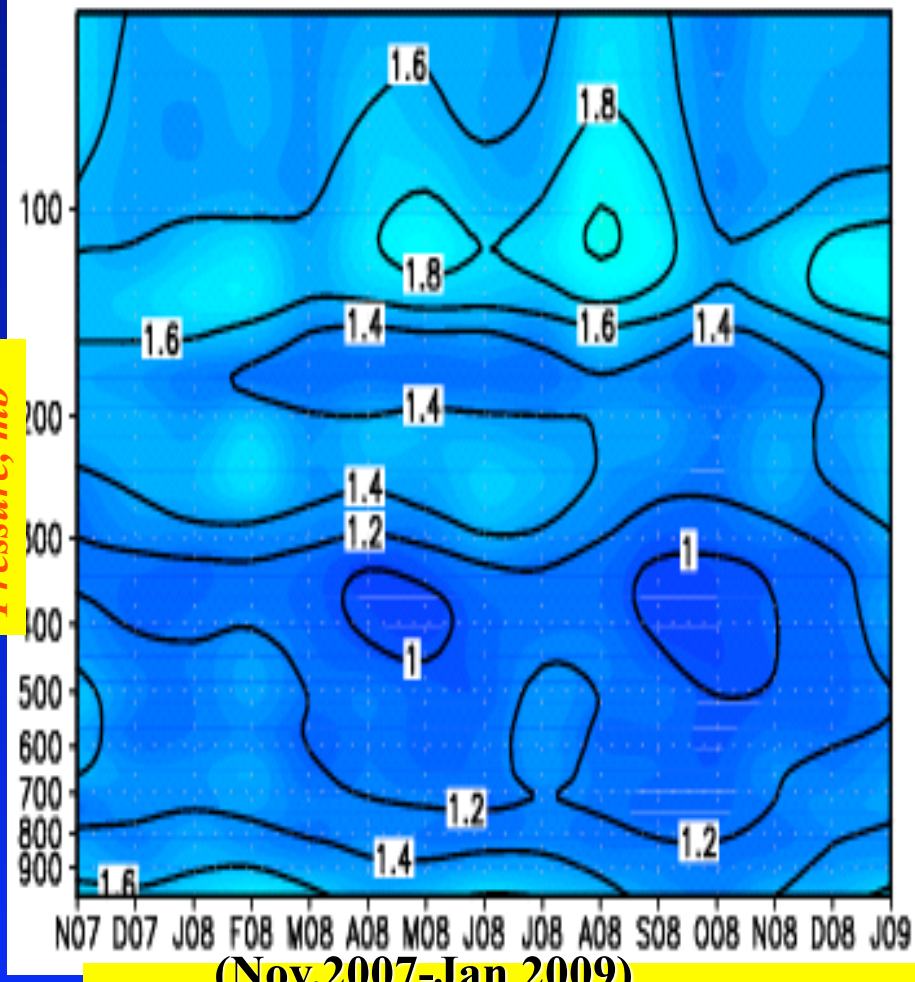
* *My earlier AIRS Science Team Discussions have some coverage on these items*
(Murty Divakarla *et al.*, JGR, 2006, 2008)

One Year of Retrievals at a Glance (Nov.2007-Jan 2009)

IASI T(p) Ret vs. RAOB; vs. ECMWF –(Ocean Day, NH)

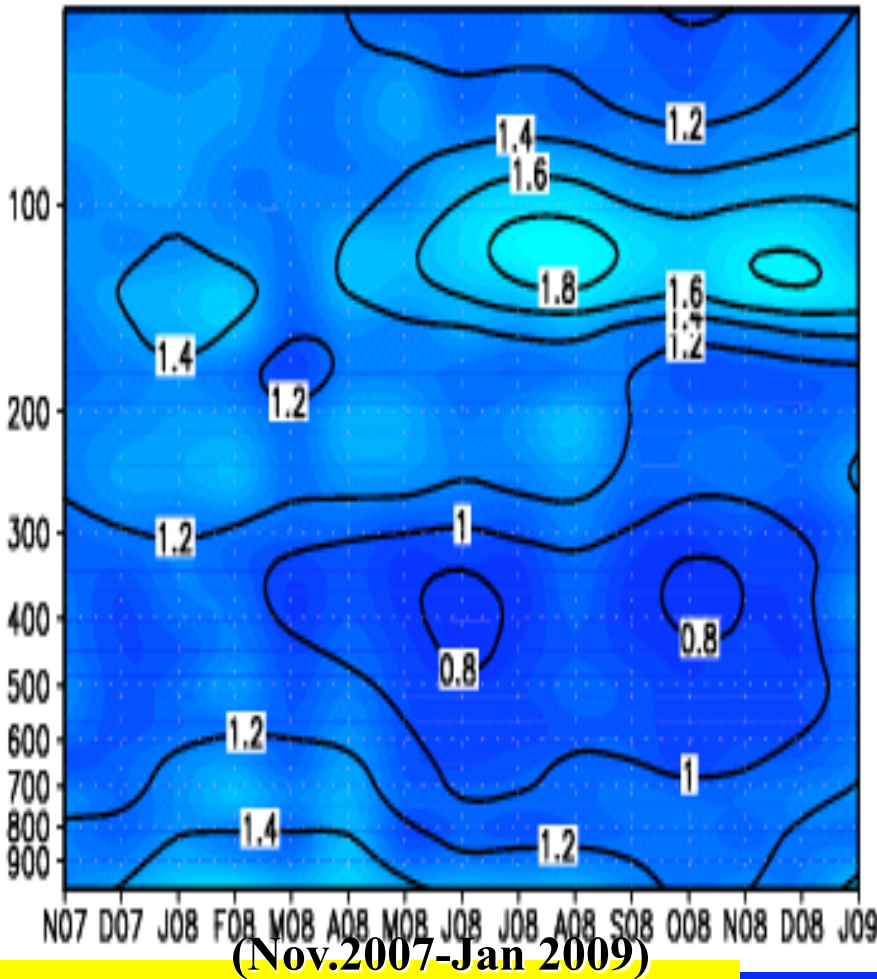
(Note: Similar Maps are Available for Land, Sea, ALL; Day, Night ALL)

IAS RET RMS (K) with RAOB (OD)



(Nov.2007-Jan 2009)

IASI RET RMS (K) with ECMWF (OD)



(Nov.2007-Jan 2009)

Spurious Data Can be Identified in a plot, and using similar plots generated for the week, and for the individual days, one can QC Check for truth, ret etc.

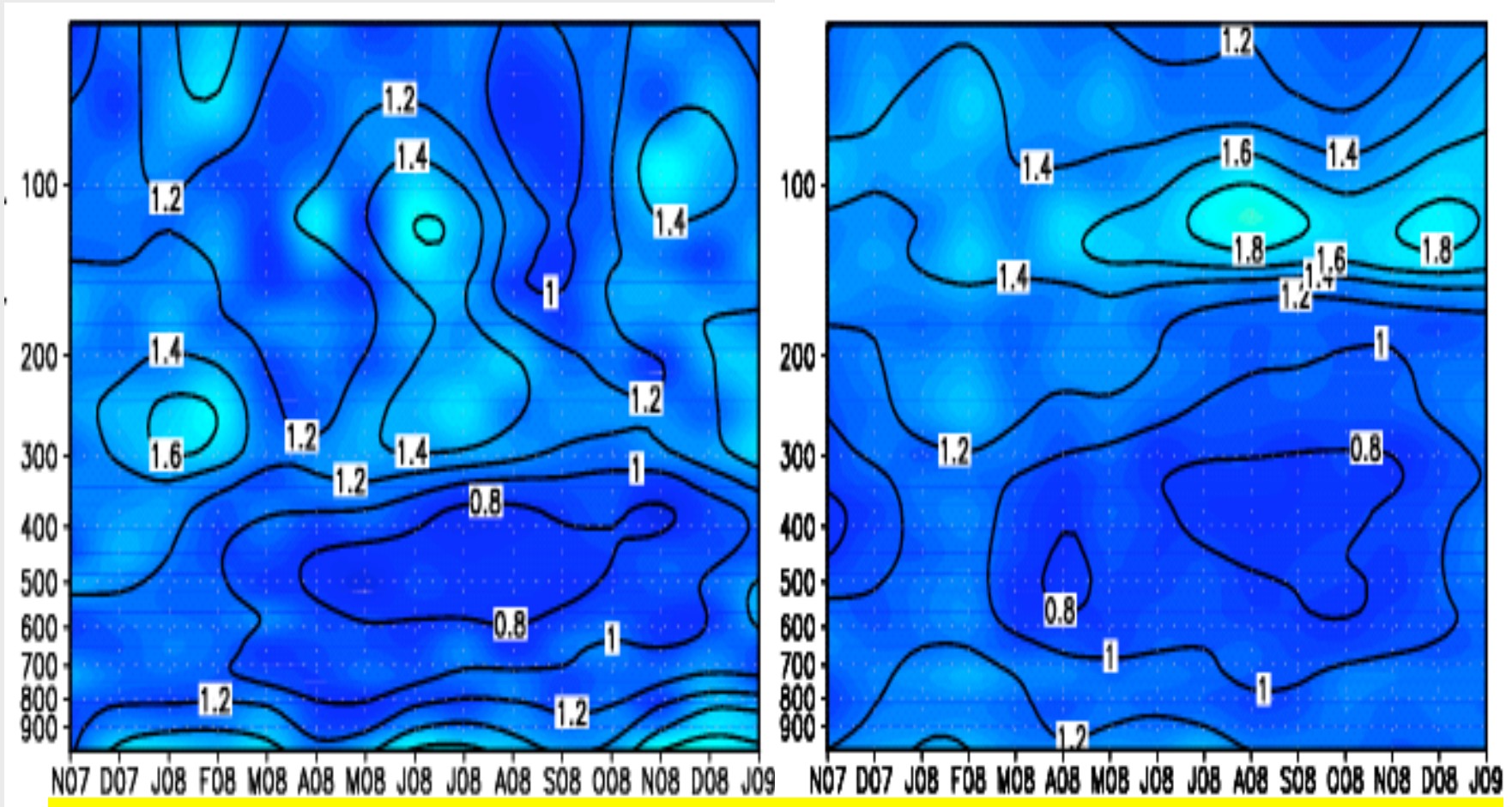
One Year of Retrievals at a Glance (Nov.2007-Jan 2009)

AIRS T(p) vs. ECWMF; IASI vs. ECMWF - (Ocean Night, NH)

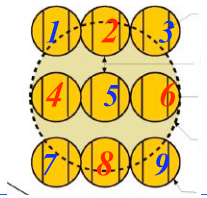
(Note: Similar Maps are Available for RAOBs, Land, Sea, All; Day, Night ALL)

AIRS RET RMS (K) with ECMWF (ON)

IASI RET RMS (K) with ECMWF (ON)



Proxy Retrievals generated from CrIS/ATMS (using AIRS/IASI) can be compared with the ECMWF or the RAOBs in a similar way

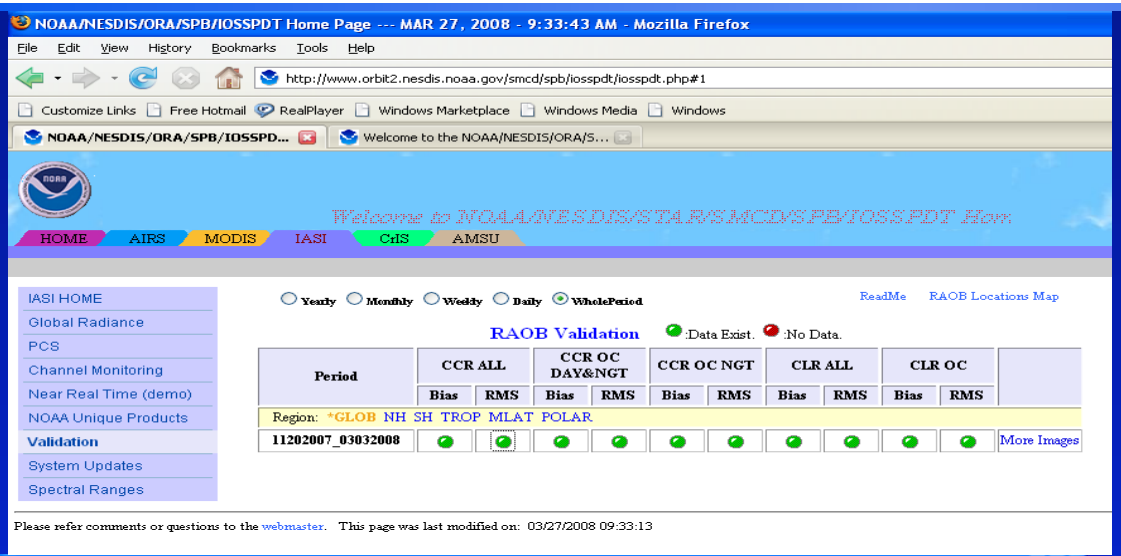


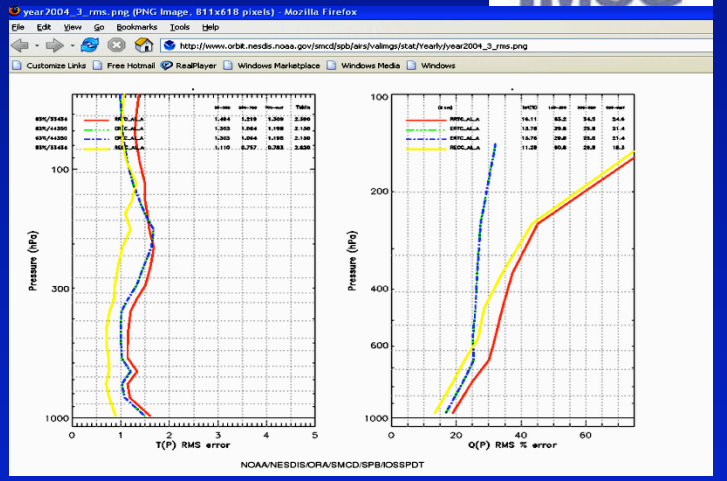
IASI & AIRS Summary Using One Year of Data (2008)

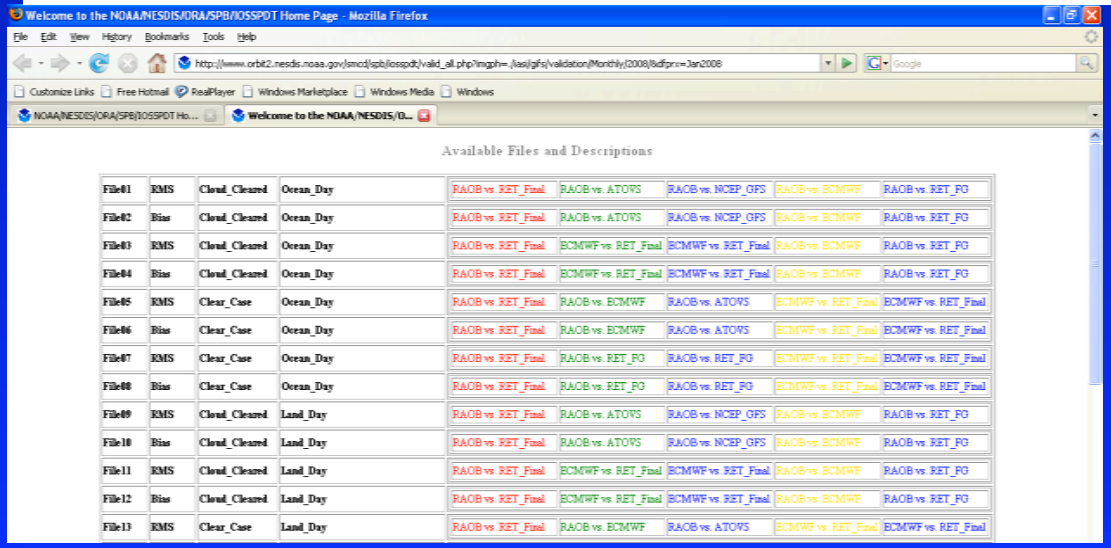
CIMSS

- **Results from this investigation reveal that the IASI retrievals are quite comparable to AIRS retrievals with a little higher yield.**
  - **AIRS Mid-Troposphere Temperature Retrievals are slightly better over the Sea**
  - **AIRS Retrievals are better over the Polar Region**
  - **IASI Water Vapor Retrievals are Slightly better**
- **The AIRS retrievals appear to attain some advantages with 9 FOV cloud-clearing compared to IASI 4 FOV cloud clearing**
- **IASI 4 FOVs – Cloud clearing**
  - **Slight tendency of confusion to contrast clear and overcast**

Web Interface for IASI/AIRS Validations







Murty.Divakarla@noaa.gov

E-mail me for any details.

Web Interface Developed by: Xingpin Liu.

http://www.orbit.nesdis.noaa.gov/smcd/spb/iosspdt/iosspdt.php#1

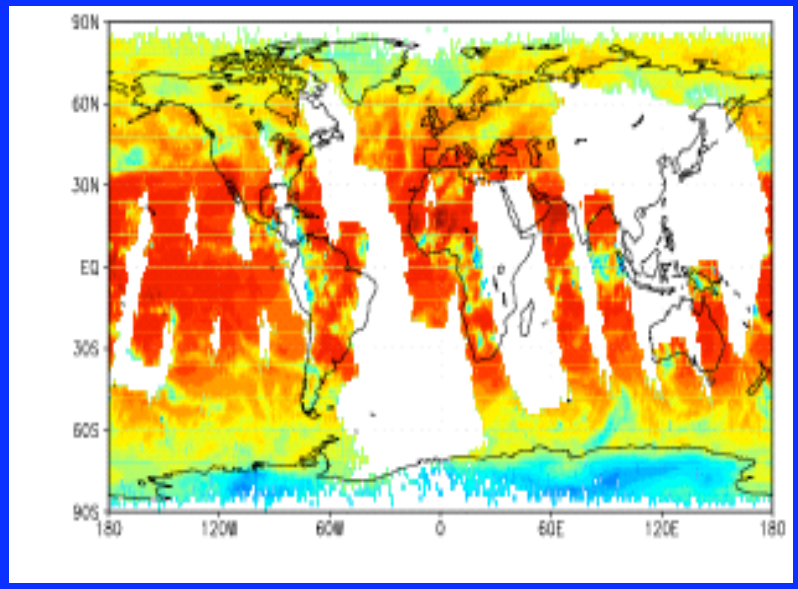
Data Set 2: Focus Day(s) Data Sets for Aqua-AIRS/MetOp-IASI

Aqua-AIRS Focus Days + ECMWF + GFS

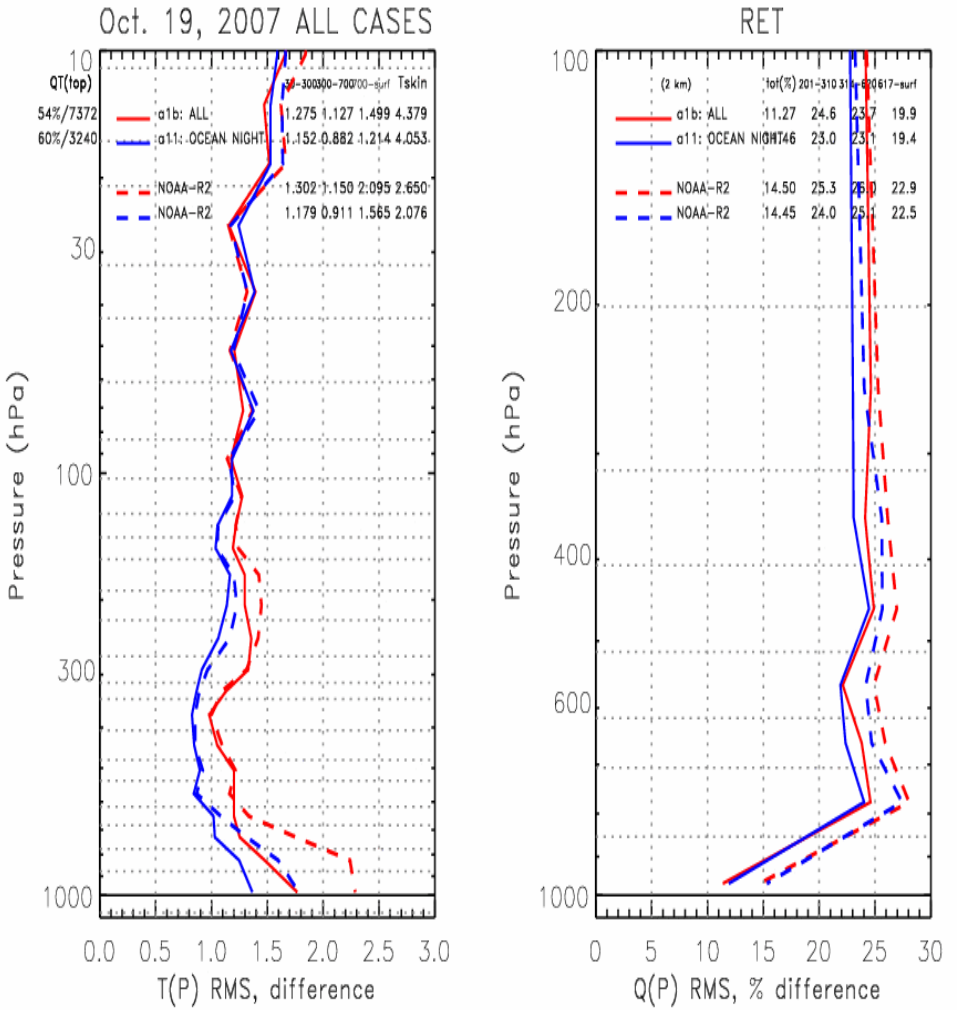
2002-07-04 2002-07-20 2002-09-06
2002-09-29 2002-11-16 2003-01-03
2003-01-04 2003-02-20 2003-04-09
2003-05-27 2003-07-14 2003-08-31
2003-10-18 2003-12-05 2004-01-22
2004-03-10 2004-04-27 2004-06-14
2004-08-01 2004-09-18

IASI Focus Days + ECMWF + GFS

2007/10/19/, 2008/10/19, 01/22/2009



2007/10/19 IASI Coverage



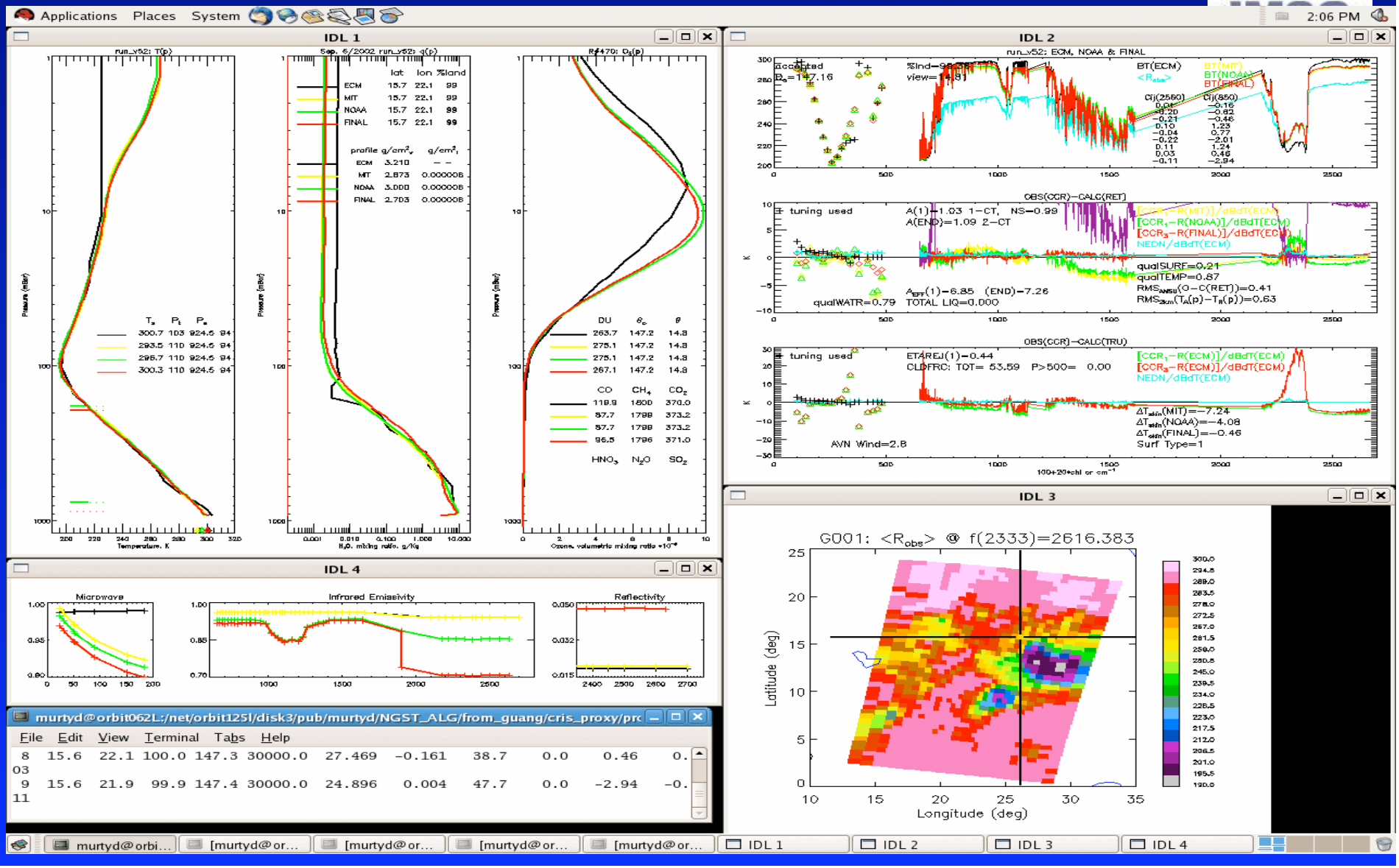
IASI/Retrieval Statistics with ECMWF

Antonia

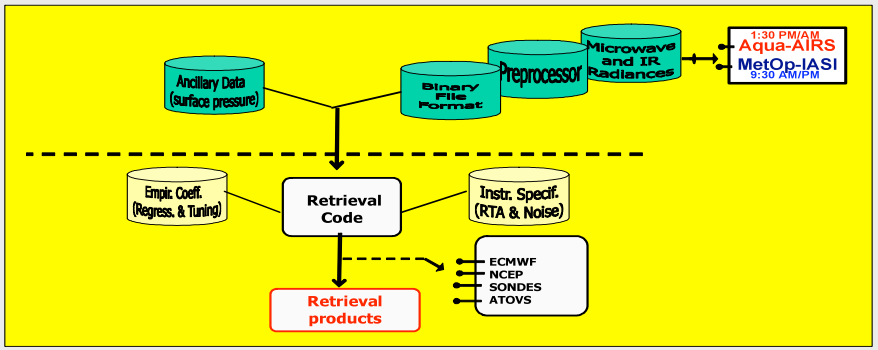
3. Diagnostic and Analysis Tools

Interactive Ret-evaluation System (IRS) at NOAA

Used in NUCAPS, Planning for CrIS/ATMS



Heading Towards CrIS/ATMS
NGAS & NUCAPS Products Evaluation Plan



MetOp-IASI/Aqua-AIRS
Match-up Database
Aqua-AIRS: (2002- Current)
MetOp-IASI: January 2008 - Current)

- RAOB Measurements Matched to Aqua (1:30 AM/PM) and MetOp(9:30 AM/PM) Satellite Observations
- MetOp-IASI/AMSU-A/AMSU-B Level1B Radiances
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- NCEP-GFS (AVN) Level2-Forecast/Analysis
- ECMWF Level-2 Forecast/Analysis
- NOAA-18 ATOVS/M2-ATOVS Level-2 Retrievals

Collocated Within ±3 Hrs. & 100 Km Radius
Data Used : January 2008 - February 2009

IASI/AIRS Focus Day Granule Files

IASI Level1C DownLoads

NOAA Binary File Granule Format

NUCAPS Products
from AIRS/IASI
Temperature/Water Vapor Profiles
Trace Gases etc.
Global Grids

Proxy Data Generation Algorithms for CrIS/ATMS

Xu Liu (IASI),
Joel Susskind (AIRS)
Bill Blackwell (AMSU-A/B)

NGAS CrIS/ATMS Operational Retrieval Science Interface Implementation

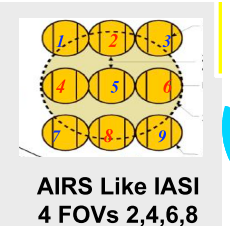
Proxy Validation of NGAS Products with
(1) RAOBs, ECMWF
(2) Intercomparison with NUCAPS Products from AIRS and IASI

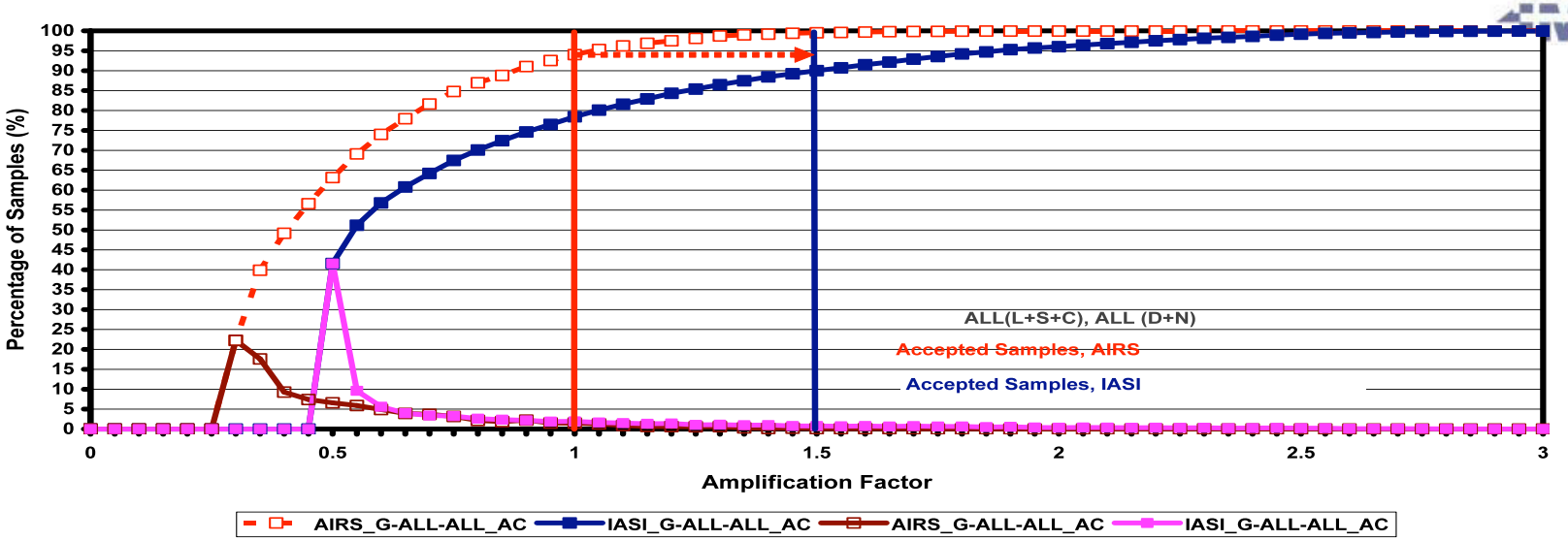
Issues : Proxy Data Generation from AIRS/AMSU-A and IASI/AMSU-A/MHS

	$\tilde{R}^{CrIS}_{i,k}(\theta) - \overline{\tilde{R}^{CrIS}_{i}(\theta)} = \sum_j M_{i,j}\left(R^{AIRS}_{j,k}(\theta) - \overline{R^{AIRS}_{j}(\theta)}\right)$	$R^{CrIS}_n = \frac{1}{N}\sum_{k=0}^{N-1}\frac{a(k)}{g(k)}\left(\sum_{j=0}^{M-1} R^{IASI}_j e^{2\pi ijk/M}\right)e^{-2\pi ikn/N}$
Instrument	**AIRS/AMSU-A/(AMSU-B) Grating, 2378 Channels, @v/1200 cm^{-1}**	**IASI/AMSU-A/MHS Interferometer, 8461 Channels@ 0.5cm^{-1}**
Orbit	**1:30 PM/AM; Altitude 705 km**	**9:30AM/PM;(ALT: 833km ~NPP C1)**
FOVs	**3 x 3**	**2 x 2**
Method Used	**Model/Regression for Proxy Data Generation**	**Continuous Spectrum with finer Vertical Res; Direct Transformation of Radiances From IASI Radiances**
Data Period	**September 2002-Feb. 2003 with MHS Need to Compromise to Use Data without MHS**	2008 to Current
Channels	**Gaps in Spectral Bands, High Noise Popping Channels within the CrIS Band**	**IASI SW has high Noise**
Channel Properties	**Not the Same**	**Same**
Cloud Clearing Implications	**AIRS 9 FOV Cloud clearing Advantage (?)**	**IASI 4 FOV cloud-clearing (difficulty ?)**

CrIS, Interferometer, ~1300 channels; Resolution in 3 bands : 1.125, 2.5, 4.5cm^{-1} ;Orbit:1:30 PM/AM; Altitude 833 km; 3 x 3 FOVs

AIRS and IASI Accepted Samples
Cloud-Clearing - Noise Amplification Plot





- **PDF(AIRS-Brown; IASI- Pink) I CDF(AIRS-RED; IASI-Blue)**
- **For a given Amplification factor as Rejection Threshold**
  - **AIRS Could place more number of Total Samples to Access for Selection.**
  - **AIRS Could provide about 5% more better quality clear-column radiances.**

AIRS retrievals appear to attain some advantages with 9FOV cloud-clearing compared to IASI 4 FOV cloud clearing. AIRS like IASI experiment (4 FOV AIRS) with real data also shows a slight advantage in cloud-clearing compared to IASI retrievals. AIRS FOVs (Overlapping and spread-out) vs. IASI FOVs (Circular and Closer) where AIRS might be having a better S/N compared IASI.

- **IASI 4 FOVs – Cloud clearing : Slight tendency of confusion to contrast clear and overcast**

IASI–to-CrIS Xu Liu's Proxy Data Algorithm

(From Xu Liu's Talk: SOAT Meeting, May 2009)
We have implemented Xu Liu's package at NOAA/STAR

Steps for Generating CrIS proxy data from IASI

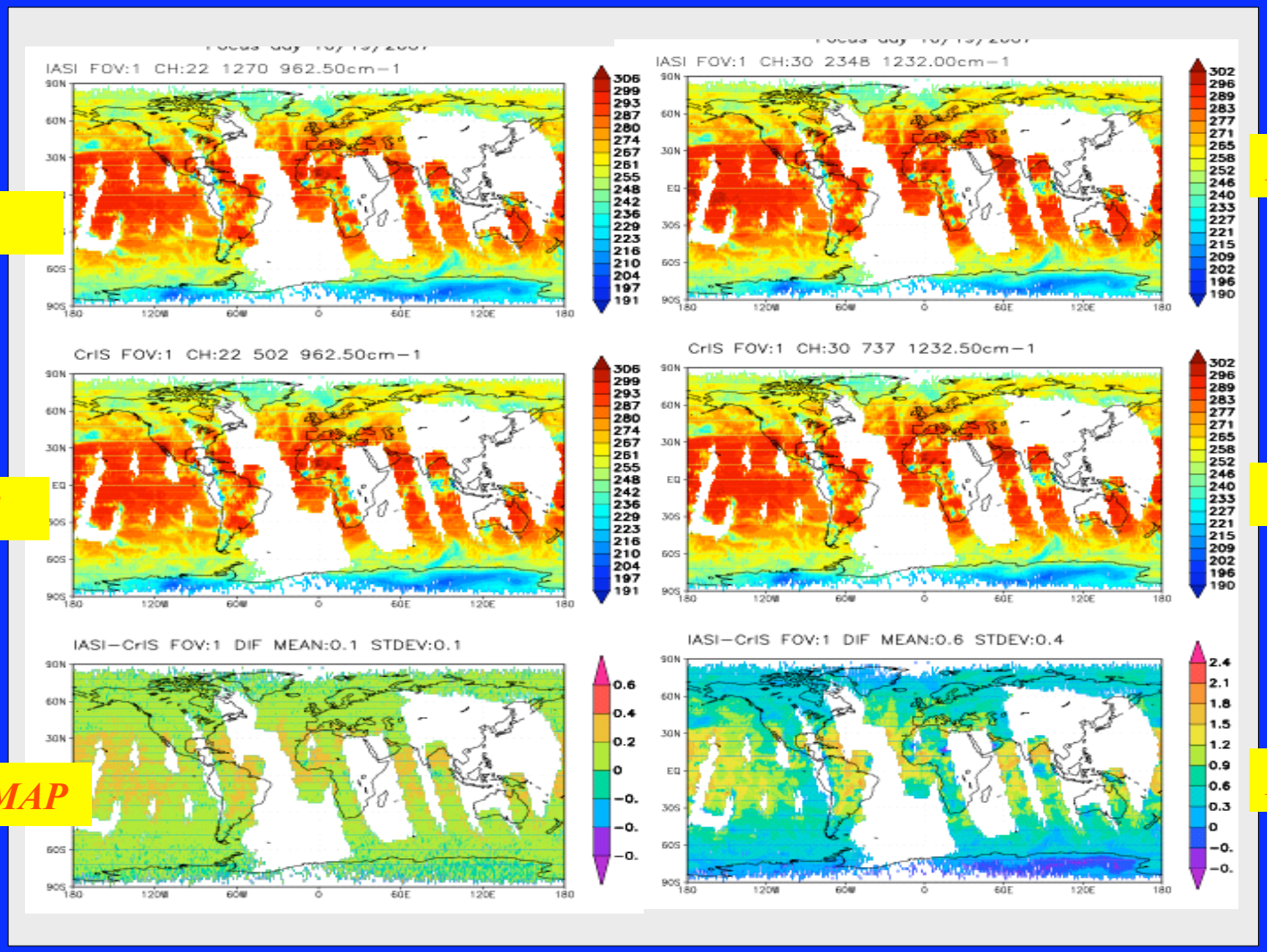
- Matching spectral resolution between two FTS instruments are easy and exact
  1. Transform the IASI spectrum into interferogram via FFT
  2. Truncate the interferogram according to the maximum OPD of the lower-resolution FTS instrument
  3. Divide the interferogram by the IASI apodization function
  4. Multiply the interferogram by the CrIS apodization function
  5. Perform inverse FTT to convert the modified interferogram into spectral domain
  6. Interpolate 4 IASI FOV to 9 CrIS FOV
- Use can choose from three apdization functions for CrIS
  - Unapodised, Hamming, and Blackmam
- Can include local angle adjustment before step 6

$$R_n^{CrIS} = \frac{1}{N}\sum_{k=0}^{N-1}\frac{a(k)}{g(k)}\left(\sum_{j=0}^{M-1} R_j^{IASI}\, e^{2\pi ijk/M}\right) e^{-2\pi ikn/N}$$

$a(k)$ is the CrIS apodizatio n function

$g(k)$ is the IASI apodizatio n function

IASI–to-CrIS Xu Liu's Proxy Data Algorithm Results for the Focus Day, 10/19/2007



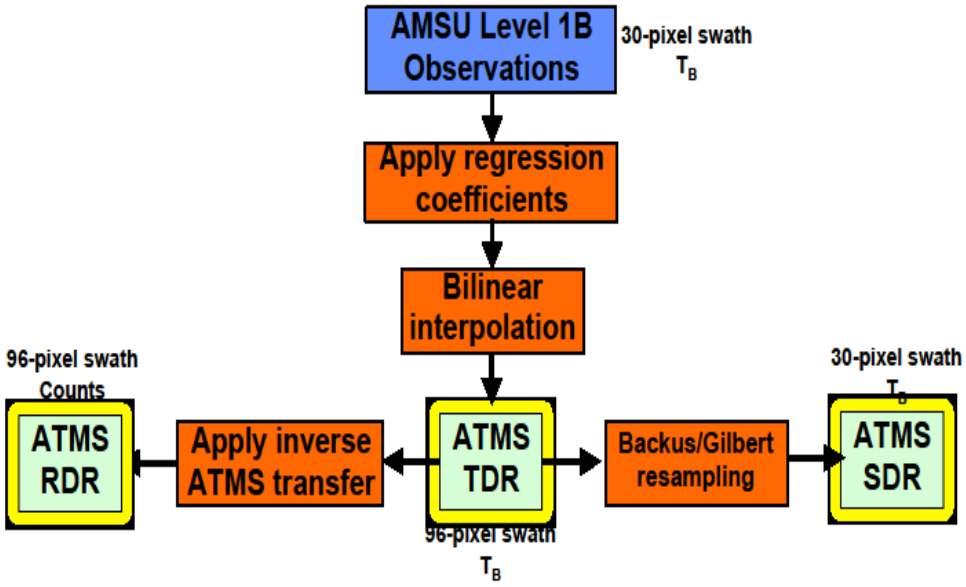
CrIS Proxy BTs are close to IASI observed BTs both spectrally and spatially.

ATMS Proxy Data Generation - Bill Blackwell's Algorithm
(From Bill Blackwell's Talk : SOAT Meeting May 2009)
Bill Blackwell has provided the Executable to NOAA/STAR

Generation of ATMS Proxy Data

- AMSU-A/B observations can be transformed (spatially and spectrally) to resemble ATMS observations
  - 11 channels are identical
  - 5 channels are identical **EXCEPT** for polarization
  - 6 channels are new, but can be estimated [with some error]
  - Footprint sizes and spatial sampling are different for frequencies < 89 GHz
  - ATMS measures wider swath angles
  - Orbits altitudes are slightly different

ATMS Proxy Data Generation Flow Chart



AMSU-A/MHS to ATMS - Bill Blackwell's Algorithm Results for the Focus Day, 10/19/2007

23GHz and 89 GHz

23 GHz

89 GHz

AMSU CH 1

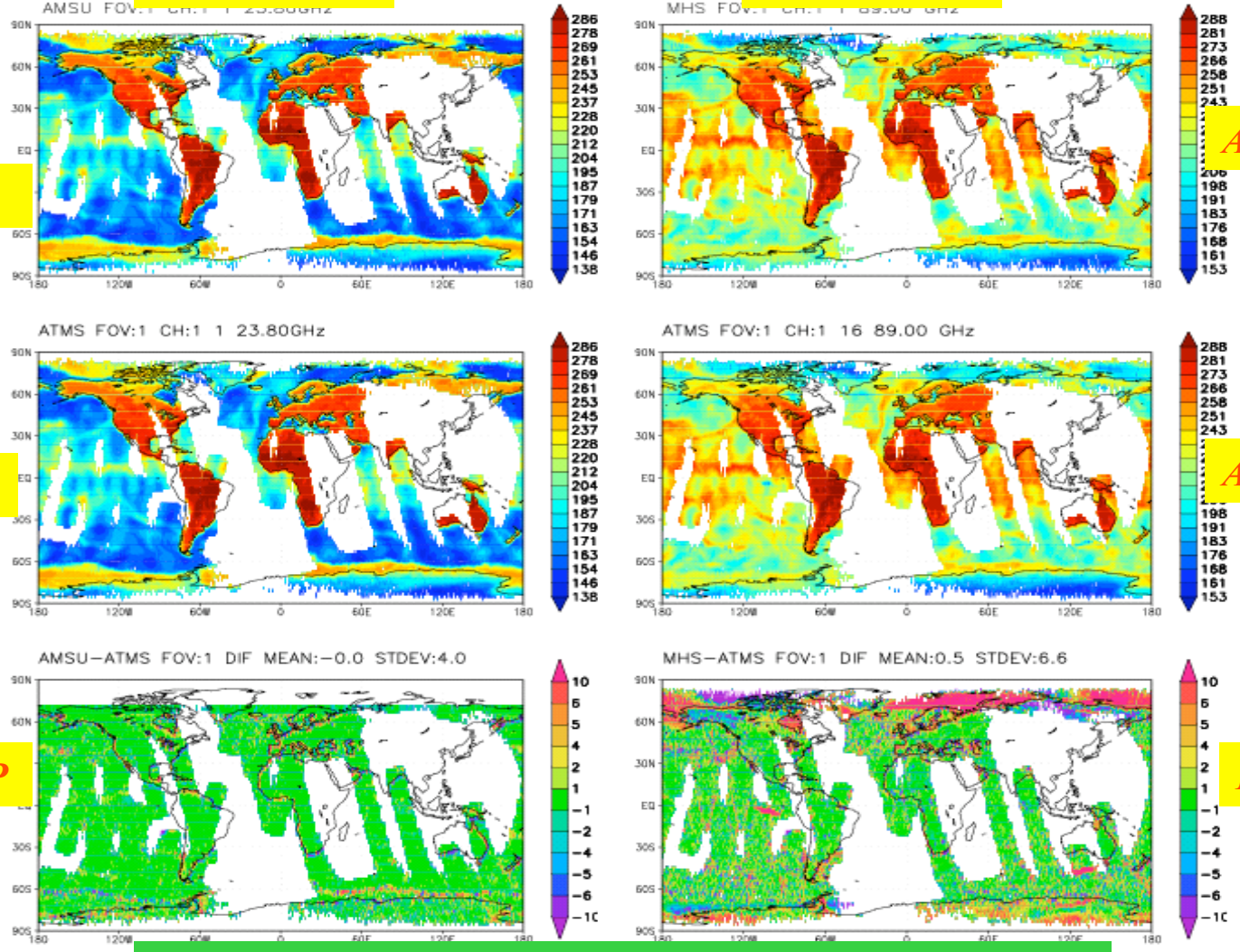
AMSU CH 15

ATMS CH 1

ATMS CH 16

DIF MAP

DIF MAP

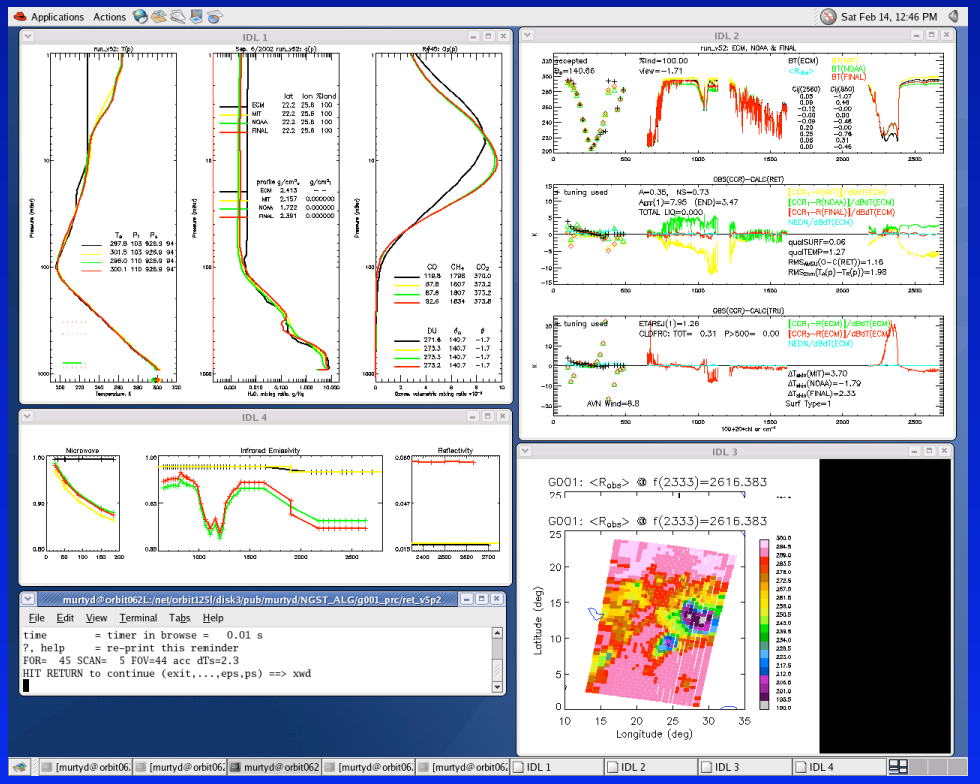


MIT is planning an update on DEM/Landmask

Preparations at NOAA for CrIS/ATMS

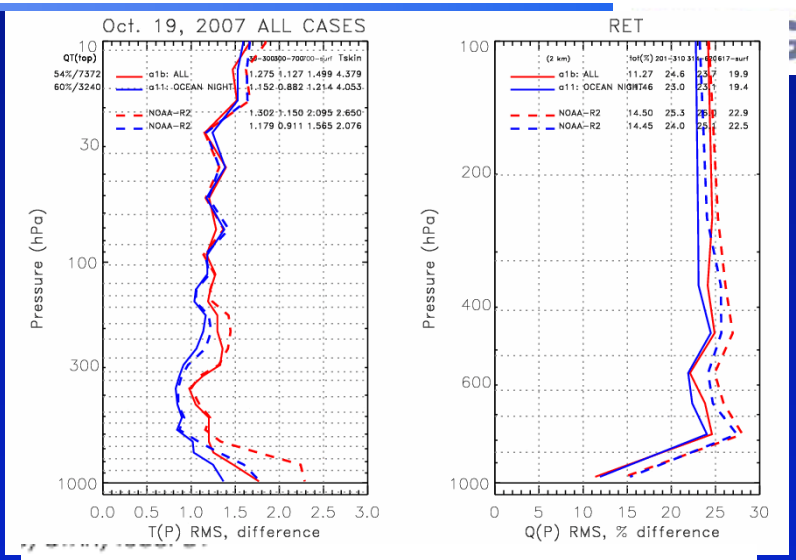
- NGAS EDR Algorithm Implemented
- Proxy Data Set Generation
  - » IASI/AMSU-A/MHS – Done
  - » AIRS/AMSU-A - Planned
- Adapting NUCAPS for CrIS/ ATMS – In Process
- Adapt AIRS/IASI Interactive Ret-evaluation System (IRS) to analyze NGAS EDRs.
- Develop Statistical Metrics to Evaluate various types of NGAS retrievals.

Pl_retccr, 'run-v52', 'G0001', 001
For AIRS/AMSU-A Sept.6, 2002.



Planned NOAA's Package to IPO

- Provide Focus Day Granule Data Sets (October 10, 2007)
  - » 253 Granules of Matched
    - – IASI/AMSU-A/MHS
    - – AVN / ECMWF
    - – IASI Retrievals from **NUCAPS**
      - FG Retrievals
      - Physical Retrievals
      - Ancillary Data
    - – Proxy CrIS/ATMS Data
    - – Proxy Retrievals from NGAS
    - – Proxy Retrievals from NUCAPS (?)
    - – Assessment Report



2007/10/19 IASI Focus Day Coverage

What We Wish to Achieve

- Help Expedite NGAS EDR Algorithm Verification with Proxy Radiances
- Evaluation of CrIMSS EDRs
  1. Whether the EDRs are Comparable to the EDRs retrieved from Similar Sounding Instruments
     1. Aqua-AIRS/AMSU-A Retrievals
     2. MetOp-IASI/AMSU-A/MHS Retrievals
     3. How good are they wrt RAOBs, ECMWF, GFS
  2. How much Improvement could be seen with the CrIS/ ATMS retrievals compared to the currently operating Baseline Systems
     - ATOVS Retrievals (AMSU-A/B + HIRS)
       - » M2-ATOVS (9:30 AM/PM) from MetOp
       - » NOAA-18/19 Retrievals; MIRS
  3. Whether EDRs can Reproduce Global/Annual Cycles
  4. Differences and Impacts of 9FOV vs. 4 FOV Cloud Clearing

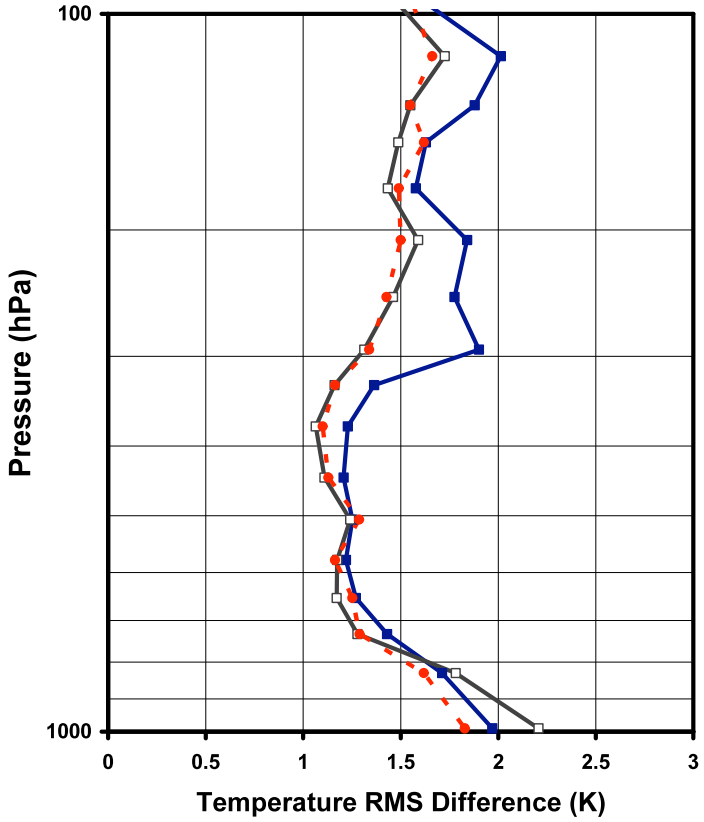
Concluding Remarks

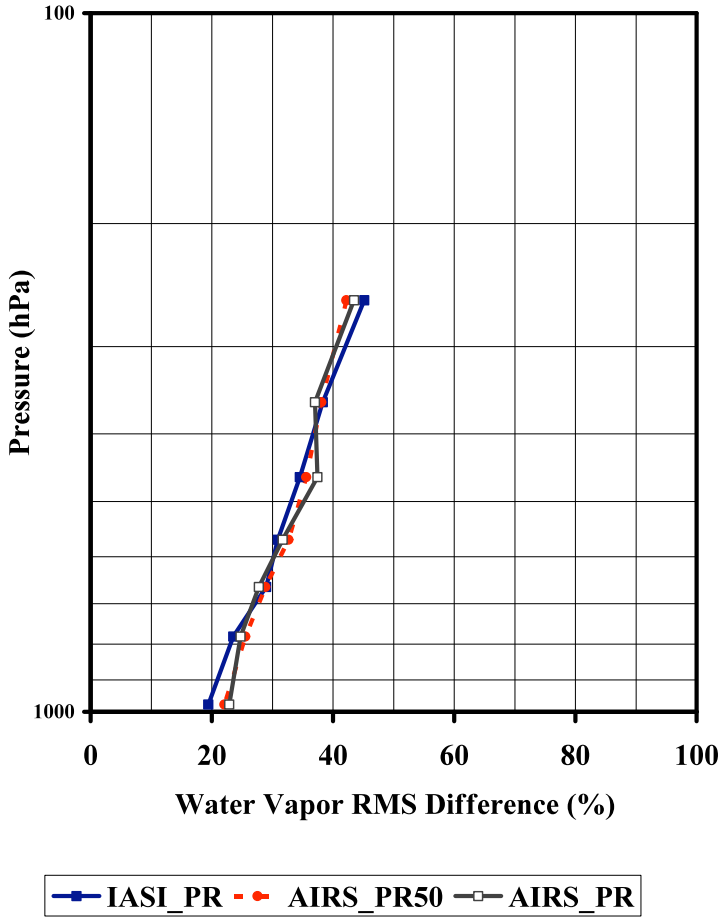
- The IASI/AIRS matched data sets (Retrievals, RAOBs, ECMWF etc) presented have the potential to provide the most needed truth data to 'Test and Validate' future CrIS/ATMS NGAS products.
  - » Proxy data sets could be generated using both the approaches (IASI->CrIS; AIRS->CrIS; AMSU->ATMS) and can be used to fully characterize CrIS/ATMS retrievals.
  - » Once optimized with the proxy data set generation, the collocated matches (RAOB or ECMWF) could be used to generate a first-guess regression methodology for the NUCAPS CrIS/ATMS System.

Backup Slides

- Thank you for your Attention
- Comments/Suggestions/Questions…
- Contact:
  - » Murty.Divakarla@noaa.gov
  - » Chris.Barnet@noaa.gov

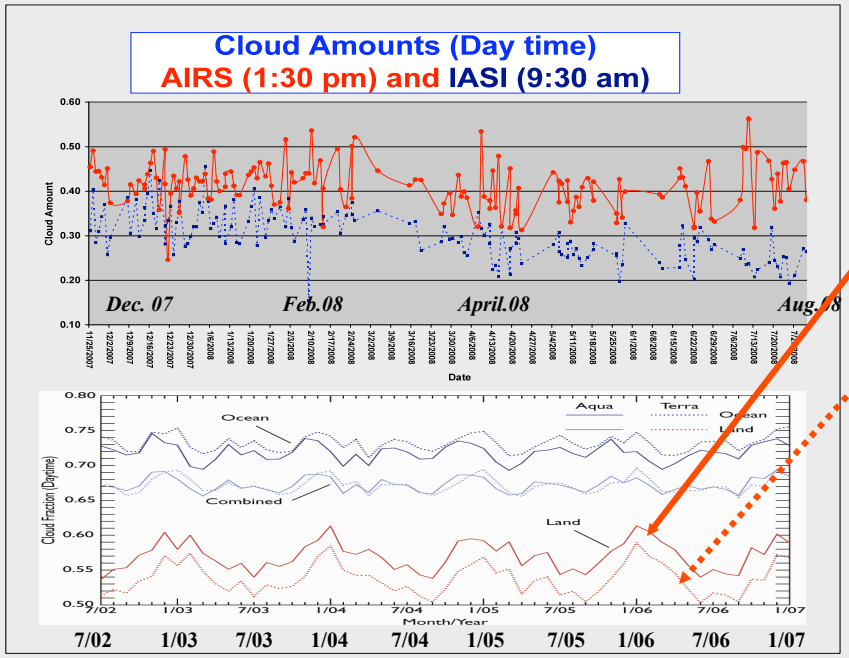
IASI & AIRS with –Rej3 and V50 QA
T(p), q(p) RMS Difference





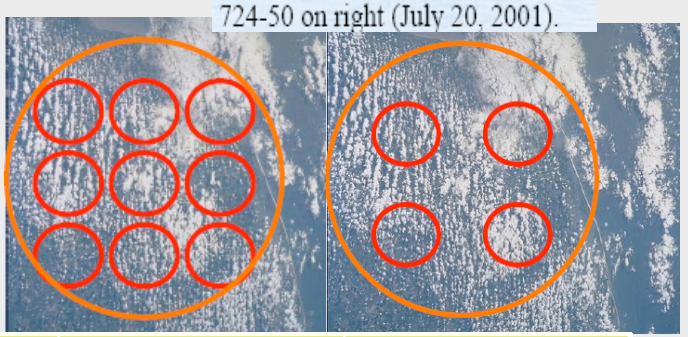
IASI, AIRS with –Rej3 Option, AIRS with V5 QA
IASI & AIRS Collocated to the same Ground Location

Experiments: Noise Amplification in Cloud Cleared Radiance



Aqua-Land

Terra-Land

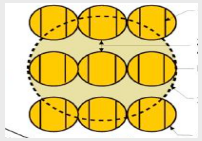


(http://eol.jsc.nasa.gov). STS104-724-50 on right (July 20, 2001).

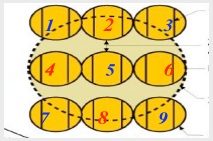
	AIRS	IASI
FOR (50Km)	9 FOVs	4 FOVs
Channels Used for CC	58 (LW, Window)	69 (LW,SW Window
Ampl Factor	1/3 = A = 10	1/2 = A = 10
Error in ή	Probably Lower	Probably Higher
Cloud Contrast	Probably Higher	Probably Lower

MODIS Derived Time Series of Cloud Fraction during the Daytime (M. D. King, S. Platnick et al. – NASA GSFC)

IASI Retrievals (4 FOVs)



AIRS Retreivals (9 FOVs)



AIRS Like IASI 4 FOVs 2,4,6,8

$$R_1(n) = (1-\alpha_1)\cdot R_{\mathrm{clr}}(n) + \alpha_1 \cdot R_{\mathrm{cld}}(n)$$

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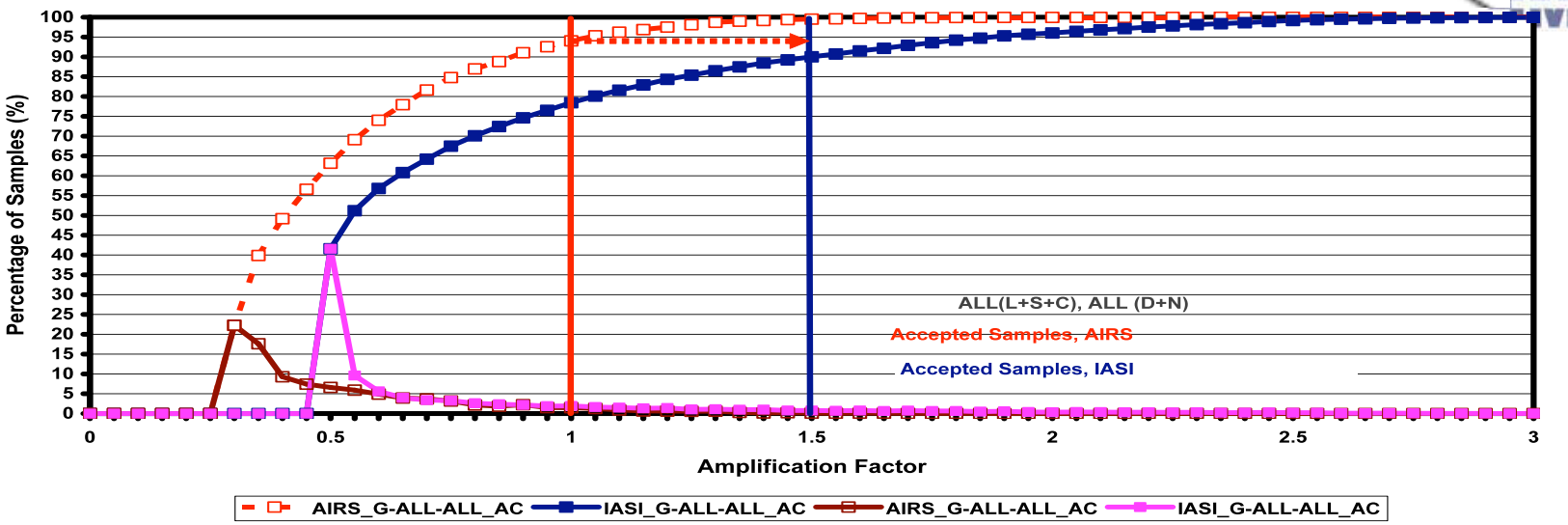
$$A = \sqrt{1/N_f(1+\sum \acute{\eta})^2 + \sum \acute{\eta}^2}$$

THREE Experiments

AIRS and IASI Accepted Samples
Cloud-Clearing - Noise Amplification Plot

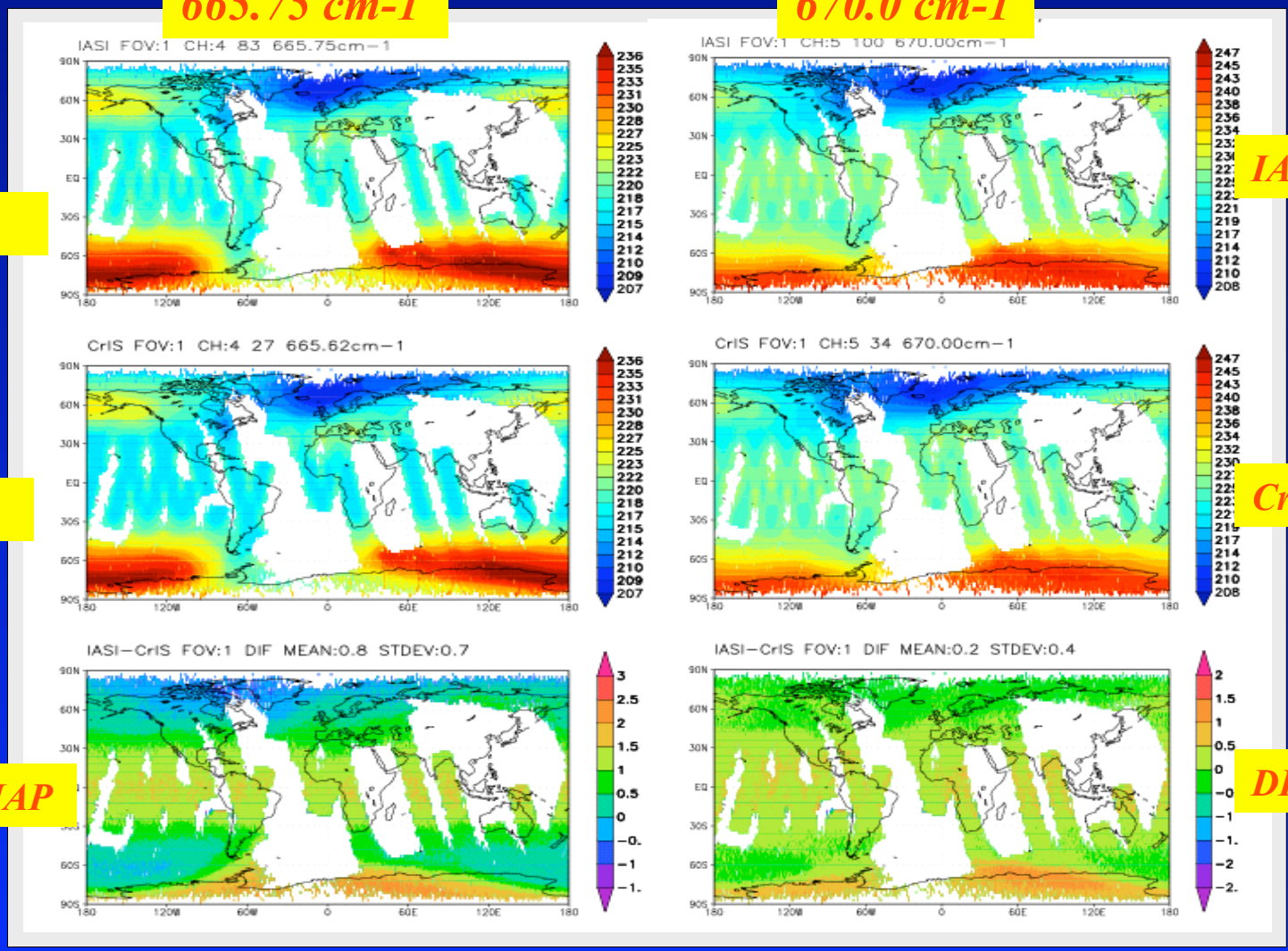


- **PDF(AIRS-Brown; IASI- Pink) I CDF(AIRS-RED; IASI-Blue)**
- **For a given Amplification factor as Rejection Threshold**
  - **AIRS Could place more number of Total Samples to Access for Selection.**
  - **AIRS Could provide about 5% more better quality clear-column radiances.**

AIRS retrievals appear to attain some advantages with 9FOV cloud-clearing compared to IASI 4 FOV cloud clearing. AIRS like IASI experiment (4 FOV AIRS) with real data also shows a slight advantage in cloud-clearing compared to IASI retrievals. AIRS FOVs (Overlapping and spread-out) vs. IASI FOVs (Circular and Closer) where AIRS might be having a better S/N compared IASI.

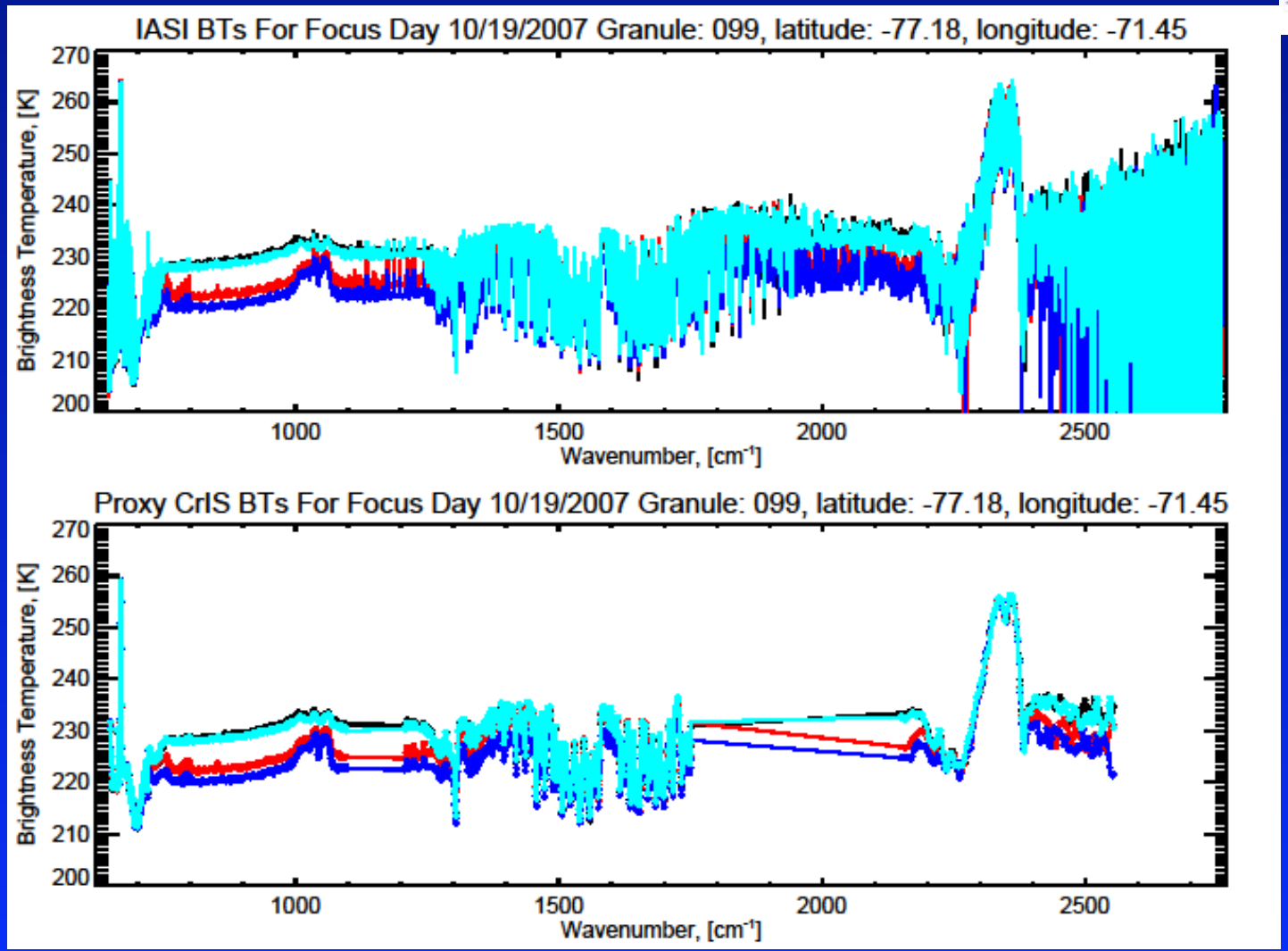
- **IASI 4 FOVs – Cloud clearing : Slight tendency of confusion to contrast clear and overcast**

IASI–to-CrIS Xu Liu's Proxy Data Algorithm Results for the Focus Day, 10/19/2007



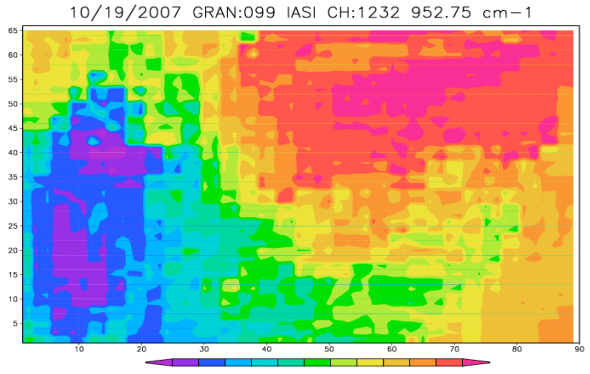
CrIS Proxy BTs are close to IASI observed BTs both spectrally and spatially.

IASI–to-CrIS Xu Liu's Proxy Data Algorithm Results for Focus Day, Gran:099, 10/19/2007

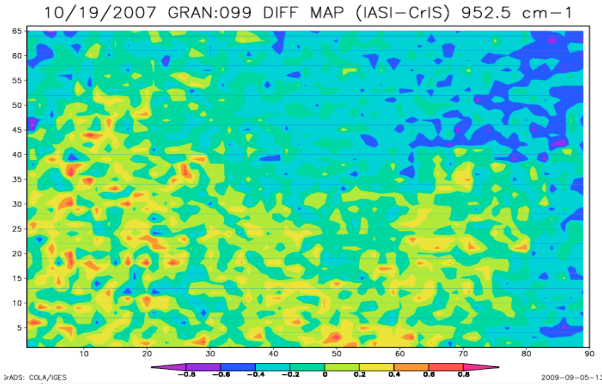


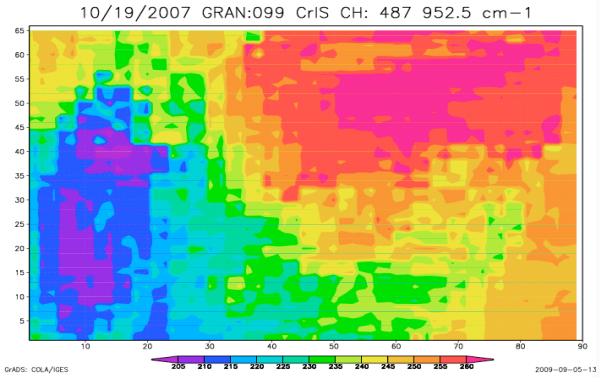
IASI–to-CrIS Xu Liu's Proxy Data Algorithm Results for the Focus Day 10/19/2007, Gran:099

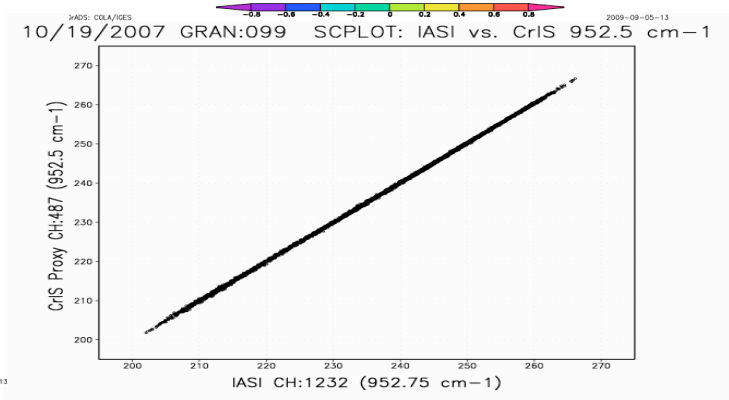
IASI CH 1232



Difmap







CrIS CH 487

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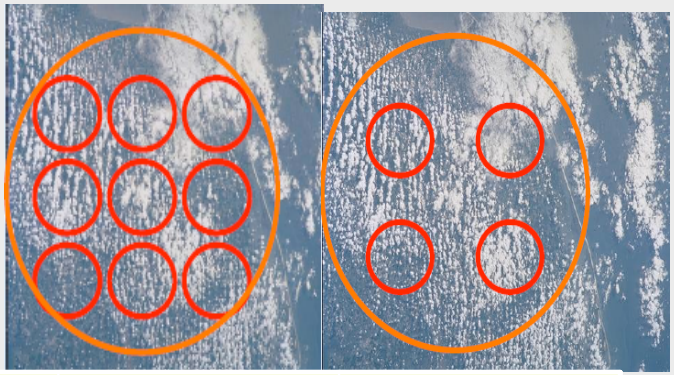
Cloud-Clearing Abilities of AIRS and IASI Implications to Proxy Data Generation



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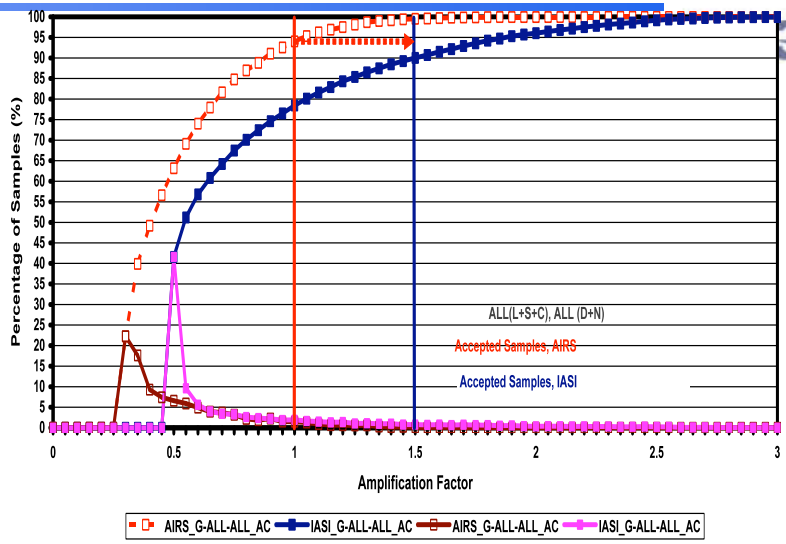

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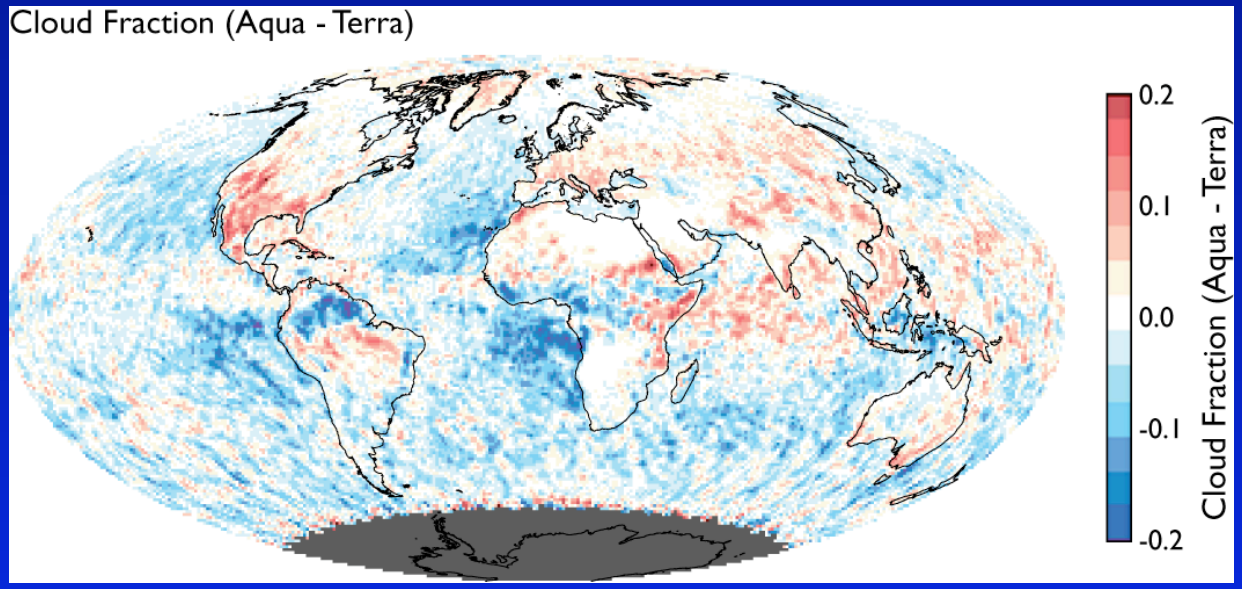
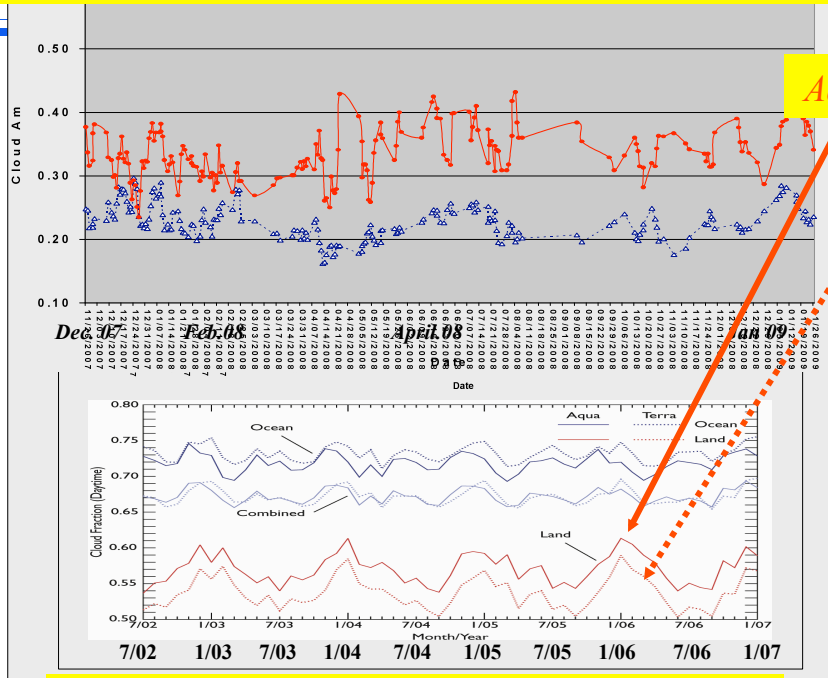
Aqua Cloud Fraction – Terra Cloud Fraction from MODIS (M. D. King, S. Platnick et al. – NASA GSFC)

- Terra
  - Higher over oceans than land
    - ✓ Marine stratocumulus
- Aqua
  - Higher over land than ocean
    - ✓ Interior continents
    - ✓ Desert southwestern US
    - ✓ Australia
  - Higher over ocean than land
    - ✓ Northern Indian Ocean



Cloud-Clearing Abilities of AIRS and IASI Implications to Proxy Data Generation

Cloud Amounts Land –Day AIRS (1:30) IASI (9:30)



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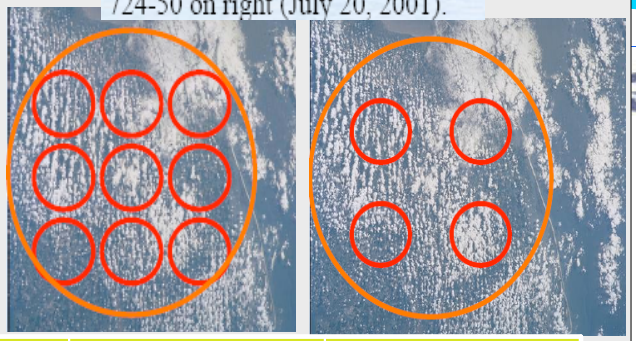

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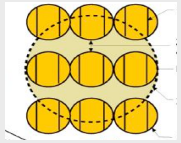

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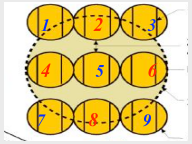

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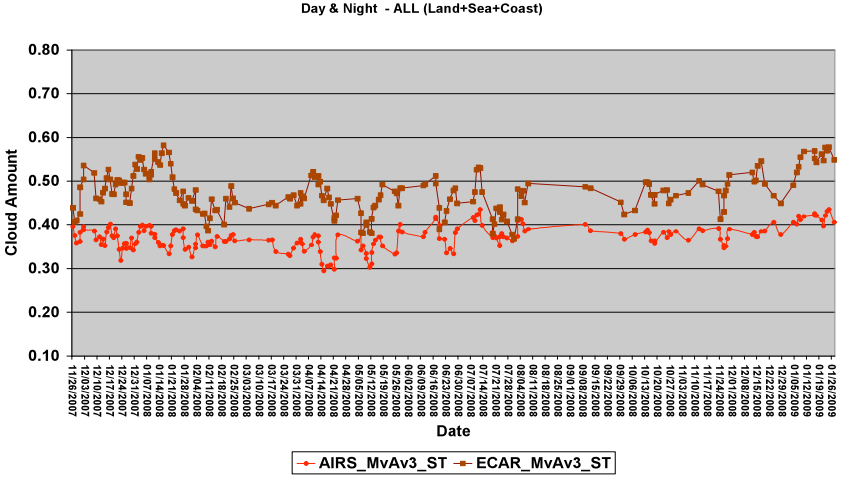
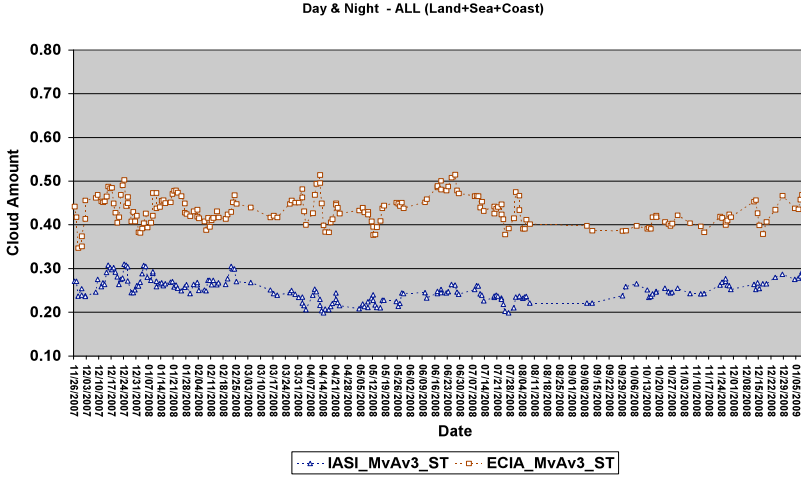
$$A = \sqrt{1/N_f(1+\sum\eta)^2+\sum\eta^2}$$

AIRS (1:30 Hrs) and IASI (10:30 Hrs) Daily Mean Cloud Fractions
The Match-up Data Set is predominantly over Land

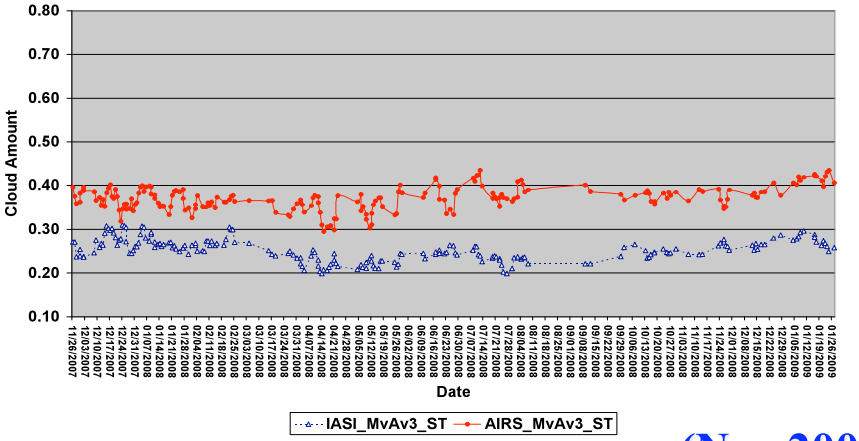
ECMWF and AIRS (9FOV) Cloud Fraction



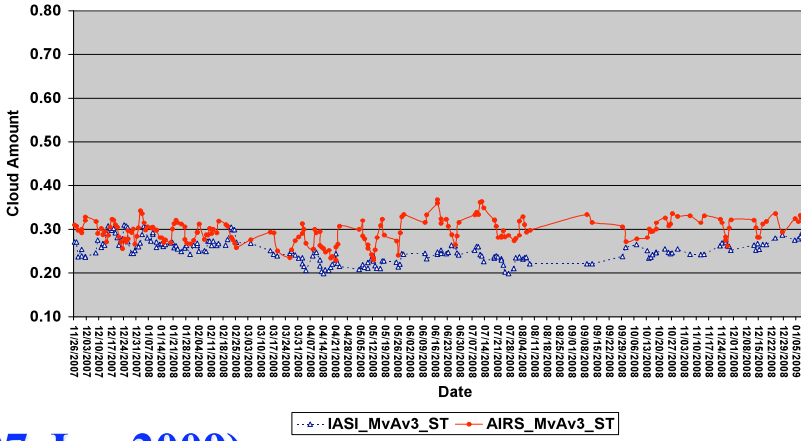
ECMWF and IASI (4 FOV) Cloud Fraction



AIRS (9FOV) and IASI (4FOV)Cloud Fraction

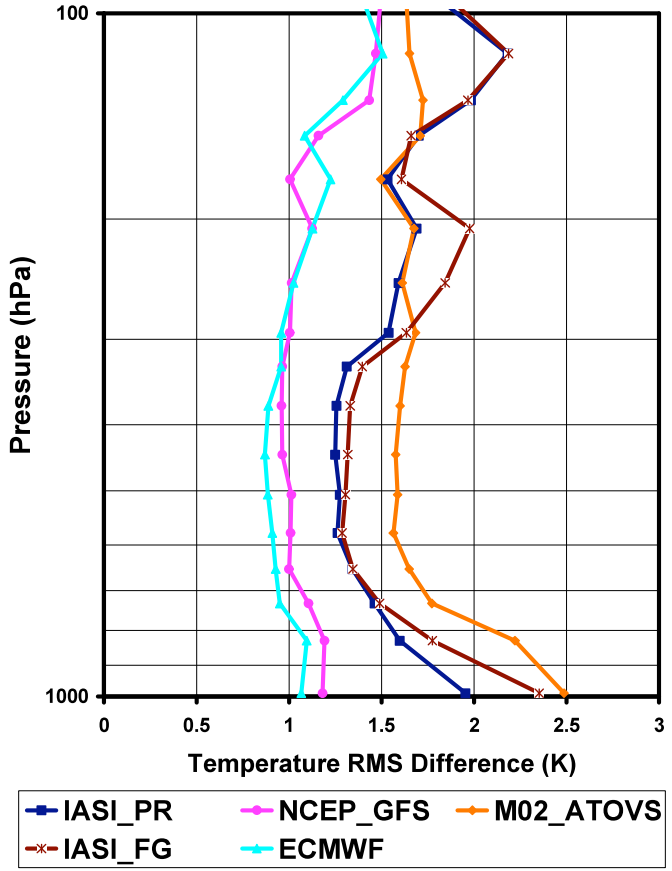


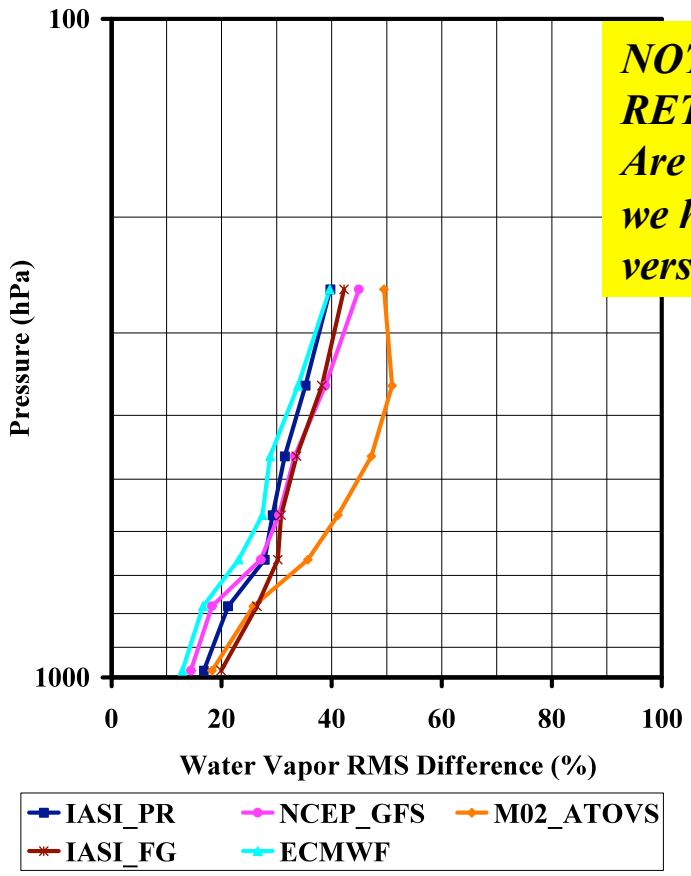
AIRS (4FOV) and IASI (4FOV)Cloud Fraction



(Nov.2007-Jan 2009)

IASI- T(p), q(p) RMS Difference
Global (L+S+Coast) NSAMP=21035 Yield: 50%
Acceptance Criteria: Mid-Troposphere Temp Flag = 0



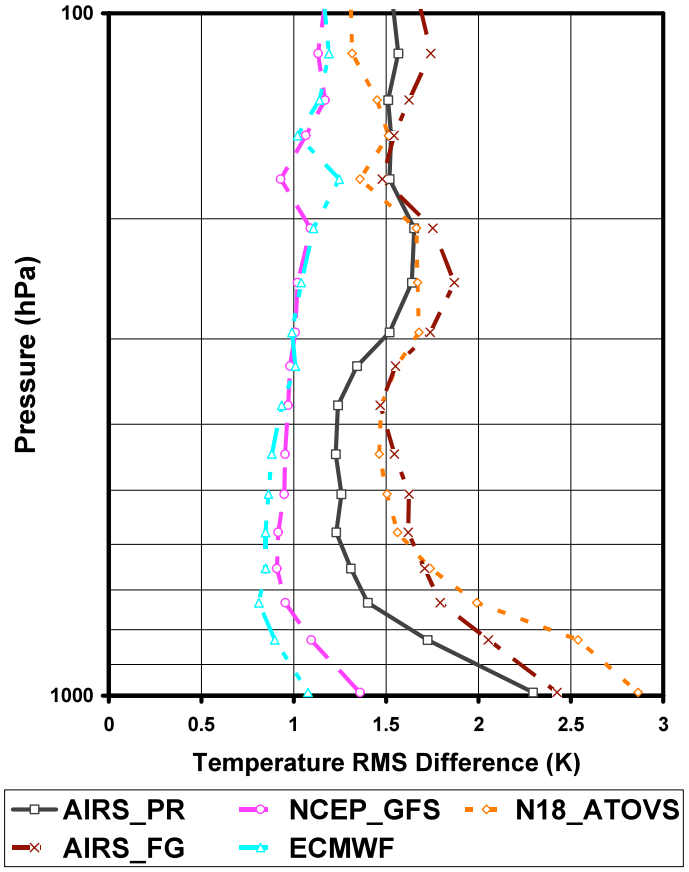


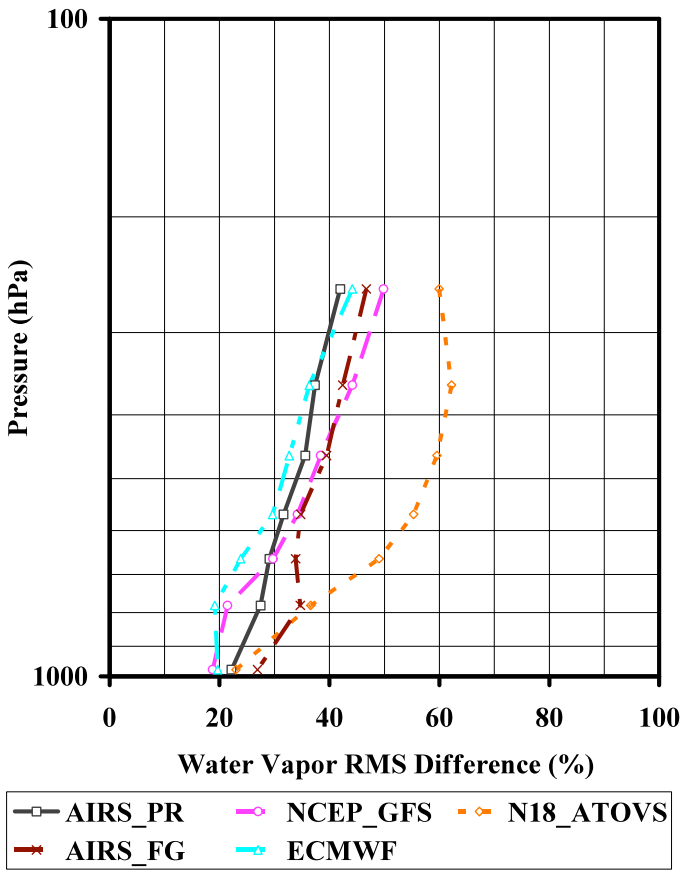
NOTE: IASI RET Results Are of V4.7 we have a new version now

RAOB *vs.* IASI AVN ATOVS ECMWF FG

(Proxy Radiances Produced from IASI/AMSU-A/MHS Can be used to generate NGST and NUCAPS retrievals using these data sets, and similar stats can be generated for CrIS/ATMS Proxy Retrievals For Global/Land/Sea etc.

AIRS- T(p), q(p) RMS Difference
Global (L+S+Coast) NSAMP=7897, Yield: 34%
Acceptance Criteria: Mid-Troposphere Temp Flag = 0





RAOB *vs.* AIRS AVN ATOVS ECMWF FG Dotted Lines : AIRS

(Proxy Radiances Produced from AIRS/AMSU-A Can be used to generate NGST and NUCAPS retrievals using these data sets, and similar stats can be generated for CrIS/ATMS Proxy Retrievals For Global/Land/Sea etc.